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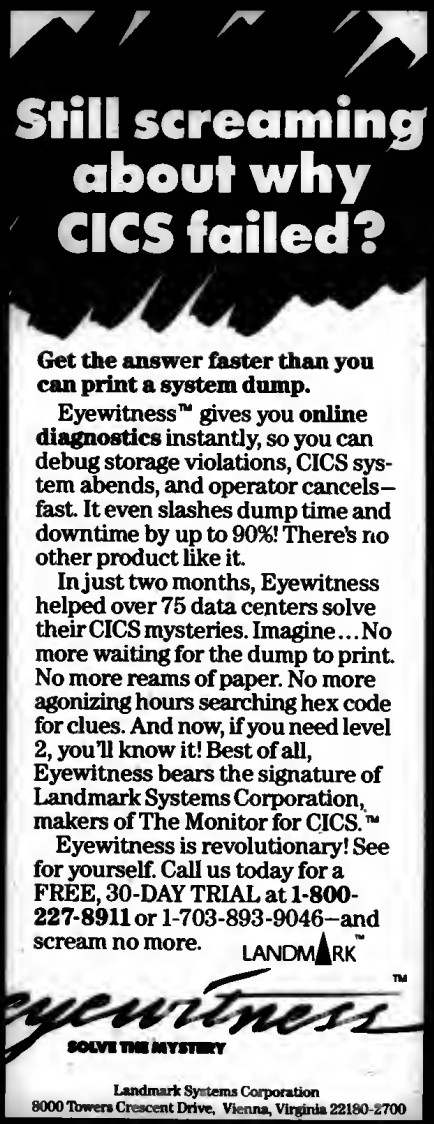
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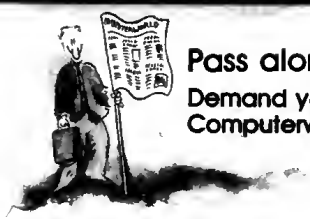

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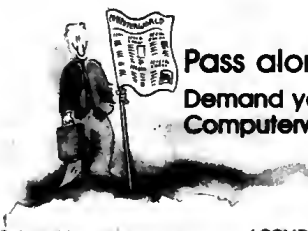

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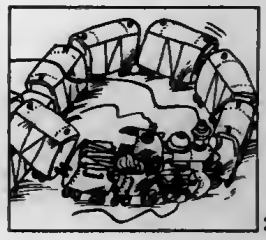
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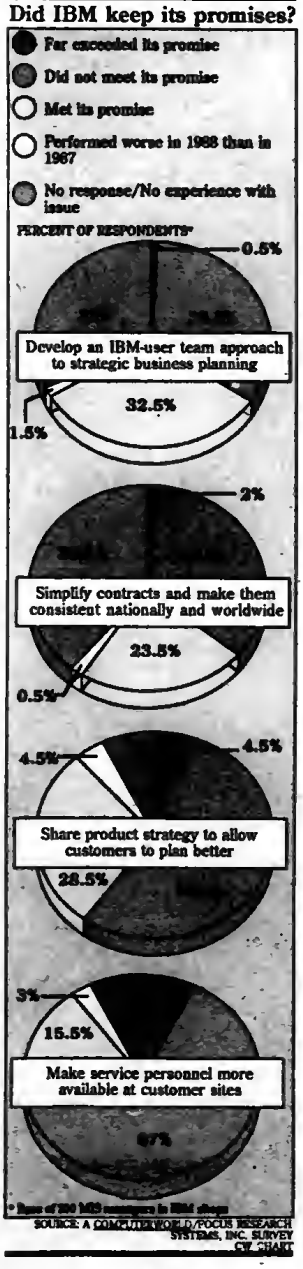
User Survey

Managers Overwhelmingly Rate IBM Adequate in Key Areas



Many are willing to wait for products even when others offer immediate solution

BY MICHAEL SULLIVAN-TRAINOR

Many vendors would face falling profits and declining market share if the user community viewed them as providing only adequate products.

But adequate performance is apparently good enough for many IBM users, according to an exclusive survey of 200 MIS managers conducted for *Computerworld Extra* by Focus Research Systems, Inc.

Asked whether IBM offers the best, adequate or inadequate products to meet managers' needs in four key areas, respondents overwhelmingly rated the company's products adequate in all the categories:

- IBM's hottest offerings — the Application System/400 and Personal System/2 — received few accolades from the managers as the best products to meet their needs. Only 17% said the AS/400 is the best product, and 13% placed the PS/2 at the top.
- Systems Application Architecture — a strategy with as yet few supporting products — received the highest rating. Nearly 18% rated it as the best. Another 27% said SAA is adequate to meet their company's needs.

There are two primary reasons that many managers are willing to accept IBM's "adequste" offerings when other vendors may offer better product alternatives. First, the managers would rather stay with IBM than pay the cost of converting their systems to another vendor's standards.

"My company, like the majority of companies that run IBM equipment, has invested vast amounts in software," says Jeff McCoy, MIS manager at Smith Meter, Inc., a division of Moorco International located in Erie, Pa. "We can't all of a sudden throw out IBM and jump on DEC just because we get an itch to do it."

Adds Patrick Cufone, MIS director for Atlas Copco NA in Wayne, N.J., "The AS/400 isn't the best product, but it is best for us because it is more universally used and has more software support. Machine for machine, DEC equipment is better."

The second reason managers say they stick with IBM is that the company promises to provide future solutions to address specific problems users are facing today. Again, conversion costs prohibit the managers from going with another vendor that may have solved the problem already.

"The thing that makes me willing to wait is the ability to interconnect the systems," says Doug Tarbet, manager of the MIS data center at B. F. Goodrich Co. in Akron, Ohio. "If multiple vendors give me a problem with that, I'll wait. We grew up with IBM, and the cost of conversion is too substantial to make it worthwhile."

Tarbet also doesn't want the hassle that comes with taking risks with new technology.

"I don't want to he on the leading edge of technology, because there are a lot of problems up there," he says. "I'd rather follow. The people on the edge are fixing all the problems that I'm never going to see."

Cufone also doesn't mind waiting. "SAA is a good concept," he says. "We are not hurt by IBM always being laid-back with product deliveries. We usually get seven to 10 years out of their products and can wait them out."

IBM users expect the company to eventually provide the solutions they require and will press their case when necessary.

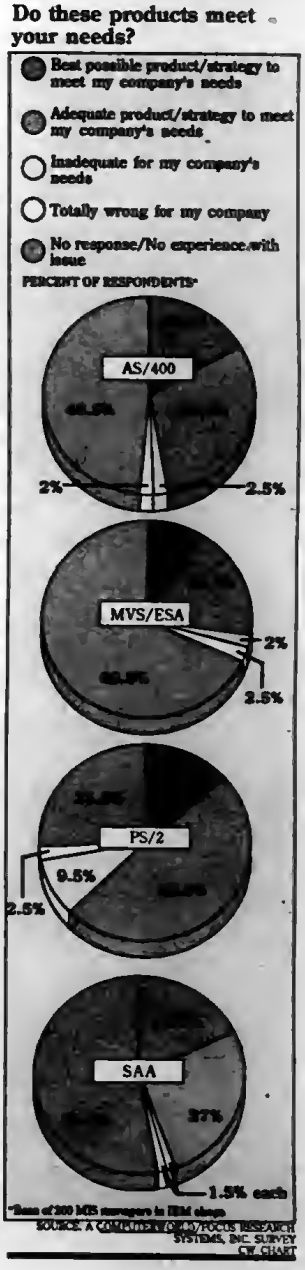
"I expect more [than what IBM has delivered so far] from them," McCoy says. "SAA is a concept they need to carry out. They've started to do that in the System/3X area through AS/400, but what about the mainframes?"

Lending an ear?

Ever since last year's Year of the Customer campaign, IBM has been working harder to listen to users. The company's answer to the perception that its products are not the best or are late to market is that much depends on the user's point of view.

"Technology is very dependent on the user's individual priorities," said George Conrades, IBM's vice-president and group executive for U.S. Marketing and Services, in a recent interview (see story page 6).

"Some people say the most important thing is price/performance; that's because they are managing the computer utility," Conrades said. "They want the most performance out of the price. But the end users say they want to he able to just turn the thing on and it helps them accomplish their work — they call that technology. I say both are technology.



"Or is the perception of the technology based on ease of use?" he continued. "Well, here is an area where we are making a significant investment and we have a way to go. We all understand that. The Presentation Manager on OS/2 is one example. I think the industry agrees that the Apple interface has been a leader in ease of use at the workstation."

Conrades' predecessor, Edward Lucente, now head of IBM's Asian operations, last year made a series of promises to improve the way IBM does business with MIS. Besides measuring opinion on IBM products, the *Computerworld Extra* survey asked 200 managers to evaluate IBM against these promises.

The results show that IBM is meeting its promises with the majority of those surveyed. IBM is doing better at paying more attention to service than to business strategy, according to the survey. Two-thirds of the managers say IBM is meeting service expectations, while only one-third say the same for helping with strategic planning.

In addition, more than half of the managers say IBM is meeting expectations about being open on product strategy, while only one-third see significant progress in simplifying contracts.

How effectively IBM carries out these promises may depend on the nature of the MIS shop involved. For example, Marty Clark, DP manager for TRW, Inc.'s Real Estate Information Services in Phoenix, would like more interaction with IBM, but he is not seeing much activity.

"In January, we must have gone through three or four IBM salespeople," he says. "When we told them we didn't want a 3090 right now but were going with used equipment instead, it seemed like we got a new salesperson."

Still with IBM

Even though Clark bought a used IBM 3083 from a third-party company, his data center still receives IBM maintenance and runs under licenses for IBM software.

"Our California data center just bought a 3090 Model 150E, and there are six IBM representatives constantly there," Clark says.

Similarly, Atlas Copco's Cufone doesn't feel IBM is interested in his company. "IBM is working more closely with others — software houses and larger companies. People like us are in the middle. We are not in direct contact. A lot of what we're asking for goes unnoticed except through Guide."

George Conquest, DP systems and vocational education officer for Southeastern Community College in West Burlington, Iowa, is in a more advantageous position. As technical coordinator for southeastern Iowa, he acts as a resource to other IBM users and has easy access to IBM product information. Conquest also evaluates new IBM software for his region.

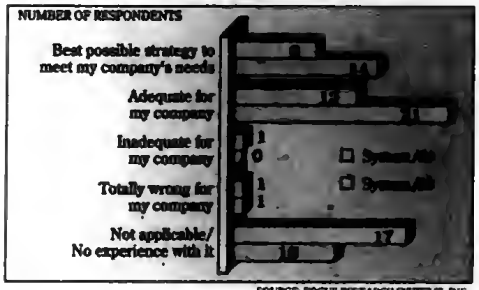
Still, he is unimpressed by recent changes. "They consolidated our contracts under one number," he says. "But the wording still favors them unless you negotiate. Anything could be better than the way it was."

The key to working with IBM, says Goodrich's Tarbet, is knowing what to expect.

"You can get into a problem if you look at what they say in terms of present products," he says. "Usually, one piece of the strategy is executed now, one piece is out in six months, and another piece is years away. If you don't understand that, you'll be buying the future and trying to implement it in the present."

AS/400 the right fit for System/36, 38 users

Results are based on a survey of 80 users



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CW CHART

TRW's Clark finds that IBM is still being open about product strategy despite his decision to go with used equipment. "They have gotten better at that than the year before."

In the service area, Clark sees two IBMs. One — the hardware side — responds whenever necessary and takes care of the problem. The other — the software side — doesn't seem to be available.

"We had some complex communication applications, and we had to stumble our way through on our own," he says.

IBM is launching efforts to address the mixture of user views, such as those revealed in the survey. Conrades' marketing division is focusing on integrating systems usage with business strategy. Various IBM lines of business are making a concerted effort to address software requirements. The company is also delving into technologies it has traditionally stayed away from, such as Unix, expert systems and supercomputing.

After 1987, IBM's year of promises, 1988 is IBM's year to fulfill past commitments and reach into the future to shape the changing architectures and information management strategies of the 1990s. ●

User View

Stephen King
Associate Director of Information Services
Harvard University

Mainframe-based data center operations continue to be the core of the Harvard University-IBM partnership. In this area, the company provides what we need: its hardware reliability and systems engineering support improve yearly.

Product advances in 370 CPU models, tape drives and printers have been significant. There is good progress on a sinthe mainframe, minicomputer and microcomputer platforms. Moreover, because it recognizes that universities are the source of many of tomorrow's technologies as well as the training ground for future business leaders, IBM maintains a commitment to education and research through its Academic Computing Information Systems group.

Where IBM could be more helpful in the university data center is in providing storage media and systems management tools. We would like to see IBM more directly involved in development of applications; we should not have to go to third parties for project management, student information and fund-raising applications. Although we are working with IBM on new applications for image processing and software distribution, the company generally needs to renew its commitment to providing complete solutions.

While IBM has made significant strides in systems architecture through a strategy of integrated product management, its application solutions and customer relations have deteriorated. IBM machines, particularly at the mainframe level, offer the latest in technical advances and support for hardware and system software products. But performance improvements have addressed internal efficiency targets, such as response time and throughput, rather than building equipment and interfaces to make computing transparent.

Perhaps even more important, IBM must become easier to deal with: It needs to reestablish much better customer service guidelines for handling telephone calls, personal contacts and follow-up procedures. Computing advances during the last three decades, as well as significant changes in the type of people using computers, are causing providers and users of information technology to reexamine the relationship between human beings and computers: The machines need to be adapted to fit people, not the other way around.

Easy it ain't

In the area of ease of use, IBM falls short. Three to five years ago IBM predominated in the education market: PC, XT and AT machines constituted 90% of Harvard's computers. Two significant developments have occurred since then: The Apple Computer, Inc. Macintosh interface has taken over the student market, and the DEC Vaxstation has been adopted by researchers using Unix. Because there is now some compatibility among most of these technologies, including paths to the Personal System/2s, in the coming years the important competitive edge will be in the area of advances in the human interface.

Harvard has a decentralized operating environment, with many local-area networks, subnets and every conceivable mini and microcomputer. IBM's commitment to supporting this environment is increasing through recent protocol interfaces such as Transmission Control Protocol/Internet Protocol. While no current IBM network product satisfactorily addresses our needs for voice/data switches, a high-speed data network or terminal devices, we are optimistic that the company's new course will provide more networking support. Two concrete steps are its announcement of products for architectural applications and its participation in standards development and connectivity projects with other vendors.

Networking, both technical and personal, will be the key to how well IBM and its customers perform in the 1990s. In the coming decade we expect Harvard to see a significant increase in workstations: at least one device for each of the 30,000 individuals affiliated with the institution. There will be a network in place for aggregating and distributing data and functions to individuals and departments; the volume and types of information managed electronically will increase significantly. To support computing demands of 100M bit/sec. at the transport level, the university will shift to fiber-optic or microwave transport media. Systems integration will become a reality, and we may even see a resurgence of common applications. Finally, along with a major consolidation in software products, hardware vendors will be forced to provide compatible solutions.

IBM invests billions of dollars annually in basic research and product development and all its bigger, better and pricier CPUs, personal computers, system software products and peripherals. Which are the crucial areas that will need to be addressed in the 1990s? First, along with major advances in optical and scanning technology, storage media and management systems will become increasingly important. Archiving, file servers and digitized voice, images, graphics and text will become a reality in the marketplace.

Second, IBM customers sorely need seamless products such as windowing systems, protocol interfaces, layered system software products (for example, SQL/DS on a 3090, AS/400 and PS/2-80) and utilities such as file transfer programs. Third, we expect to see multifunction devices and software that is available electronically.

The most important first step for IBM, however, is to improve its customer relations. Technical discussions must be part of business solutions, and the marketing staff must spend more time in the field. Technology should be making us work smarter, not harder. ●

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Interview

GEORGE CONRADES

New head of marketing promises sales reps with more business savvy

In his first in-depth interview since becoming the head of IBM's U.S. Marketing and Services Group in July, George Conrades, senior vice-president, outlined his mandate for the next several months. He was interviewed by *Computerworld Extra* Editor George Harrar and Senior Editor Michael Sullivan-Trainor at the marketing group's new White Plains, N.Y., headquarters.

As the new head of marketing, what are your top three objectives for 1989?

Since July, we have been working on what we call our marketing function strategy. Our vision for marketing — which, in this case, is marketing and services in the broadest sense — is to be recognized as the premier solution. We want to be viewed as the best at applying advanced information systems technology to help customers solve business problems, manage change, achieve more than they ever thought possible. In a phrase, help them be more competitive.

That vision is important because it is customer-driven and solution-oriented. You notice that I didn't say anything about boxes and I didn't say a lot about IBM other than we want to be the best at helping customers. It is a very outward look, a very customer-oriented look.

As you may know, I spent nearly three years setting up our Asian and Pacific operations. If you ever want to get an understanding of the real meaning of "customer," go to Japan. Their word for customer roughly translates in English as "honored guest," or "you before me." It's that focus on the customer that is the genesis of our strategy here.

Underneath that we have six key elements. One of them is called "focus on the customer." To do that, you need to change your measurement system, the way you measure yourselves.

The second one is "market solutions, not just systems."

The third element of the strategy is to expand our relationships with business partners, to work with the industry in pursuit of our objective to help customers solve business problems.

The fourth element is what we call "quality in the marketing process." In this area would be things like industry and technical education for our people, technical support for our customers and our relationships with the other IBM lines of business. We want to be more market-driven as a total company.

The fifth area is delegation and responsiveness. In July, we brought in a new management team; we also eliminated divisions. Now we are really 12 geographic areas and two more specialized areas, one for General Motors/Electronic Data Systems and the other for national federal marketing. We are decentralizing, moving the decision-making closer to the customer.

The final point is leadership. That's both in headquarters and in the field. That has to do with the training, the capability of our management team, being more of a businessperson, and a greater emphasis on proprietorship. We're going to decentralize, delegate more. It means we have to trust a greater number of people to treat their responsibilities as their own business. In that way, we react quicker, taking some risks, but respond to the customer above all.

You are not starting out in a vacuum — your predecessor, Ed Lucente, had objectives for the last year. Which of your objectives do you see as departures from the way IBM was generally behaving before?

Many of these things were in place, and we are building on that. In the past few years, we have shifted increased resources to the field organization. The twist I would put on it now is to say, yes, we have added a lot of resources, but now we are adding more specific industry training and technical training. We are looking at how the skills of these people are being developed and at how are they being deployed.

I think it's a sea change we're going to make in the measurement system and in the sales plan. All this activity, by the way, is really bottoms-up — we have branch teams and area teams working with headquarters. This is not a top-down implementation.

The implementation is bottom-up, but the vision is top-down?

It's kind of shared. We have a number of surveys of our employees and customers that support the need to continue the changes that we have under way. We asked six advertising agencies to compete for our business this year.

One of the projects we gave them was to help us determine the position of IBM's brand image in the marketplace. Amazingly, the six came back with a very similar report. They said, "IBM, your brand image is quite strong. The emotional and rational response that it elicits is very deep. You are known for advanced technology, quality of your people, breadth of your products and services and your fundamental financial and ethical foundation. You are perceived as enduring and durable."

But then they challenged us. One company put it into the form of questions from the individual customer's point of me: "Do you care about me? Do you care about the success of my business? Can you really tailor a solution that meets my business needs?"

And from the point of view of the new breed of acquirer — not necessarily the Fortune 500 MIS director, but those who are now acquiring and implementing technology across the firm, be they department heads or individual users themselves — "Do you respect me for what I've accomplished?"

Everyone in the delivery system, everyone in IBM, really understands that we must be able to answer those questions better than anyone else if we are to grow with the industry, to lead the industry.

We had a survey conducted for us by Focus Research, Inc. of 200 information systems managers. One part asked them to rate four products from IBM as the "best possible product," "an adequate product to meet their needs" or "inadequate."

The majority in each case said IBM's products are adequate. Don't you think this kind of response from basically IBM shops poses a challenge to you in positioning IBM as offering the best . . .

At providing solutions?

In terms of specific products.

If you are going to provide the best possible solution to a customer's problem, implicit is that the application fit the customer's need. Underpinning that would be the hardware, the software, the application itself, perhaps the systems integration services, perhaps the maintenance and other forms of ongoing

ANDY FREEBURG

services, such as the telecommunications network.

Now, as in everything else in life, you have to have your eye on being the best in every one of those. Often the customer will make his decision on the total array, the sum of those being the best. But we want to strive to be the best in each of those elements.

So it's not essential for IBM to offer the most sophisticated technical solution as long as the other elements . . .

But we want to offer the best technological solutions. You construct a home starting from the best possible design, using the best possible materials, installing them with superior craftsmanship and also making it easy to maintain at low cost over time. You really should have excellence in all of the elements.

Much of the emphasis is on products, because they are the more easily comparable items among vendors. A competitor can come out and say, "Our features are better than IBM's in these ways." Would you say there is too much emphasis on single products and their capabilities?

Only too much emphasis in the sense that if that's the only thing we're talking about, we haven't opened the aperture wide enough. Remember that we and the MIS directors are partners in providing solutions.

Remember that the ultimate acquirer of technology often now is the division or department head. They are really looking for a solution to a business problem. After all, these are the people within an organization that "do."

In all this restructuring in American business, the whole intent is to slim down the layers within an organization, have more people in the "do" function — as John Akers likes to say within IBM, those that design, make, sell or service. The rest is in the indirect structure. In most American corporations, they are being restructured, reduced in number or eliminated.

Do you see reductions in the ranks of MIS then?

No. In fact, the question becomes, What helps fill the gap? There was some assumption that the indirect overhead was doing something, and yes, they were helping manage data, analyze data, provide answers to those who "do." That function is what we're talking about today, with the use of executive information systems and strategic information systems or the utilization of technology to better underpin a slimmed-down corporation and help those that "do" do better.

The users themselves are often in a position to acquire technology, manage it within their budgets and do this in conjunction with corporate MIS, because often, corporate MIS is providing network and database services. So the MIS director is acquiring technology from the point of view of the internal value-added remarketer and helping wrap software and solutions to meet the needs of the end user.

Do you market this solution to the ultimate acquirer or to MIS?

Both. The user in most organizations today is paramount. I keep going back to this point — understand the restructuring of American business. To be more competitive, almost every business is pushing more and more out to the "do" function — design, make, sell, service. That's where the action is. Those individuals, whether they be in branch offices, development laboratories, factory floors or engineering design centers, are the ones who have the business problems.

Because of the pervasiveness of technology, more and more of the "do" functioners, be they division presidents, department managers, heads of work groups or individuals, are able to acquire, install and manage technology of the MIS department — or as partners with the MIS department.

MIS could be providing services and may also have some approved selection list for equipment. But the "do" function is often now involved in the equation more than before. That is where technology is going, and ease of use is a part of it, and price/performance is a part of it; and by the way, that's where most of our competition is calling.

You make the calls along with MIS?

Every customer situation is different, but most of the time it is with the knowledge of — and, in many cases, to the benefit of — MIS. After all, these are the people who have the problems. When you understand the user and work with him, the technology comes much later in the discussion.

This is done in conjunction with the MIS director, because the MIS director often has a say in one form or another on the acquisition of technology. And the interesting thing is, many of the applications that are developed relate to one another and usually end up in quite a system development and quite a system sale.

For example, just think of manufacturing. Manufacturing, starting with the customer, has to do with the firm's order processing; then you get to the requirements process. That gets you into engineering design. What happens to the output of the engineering design? It goes into the business production and planning system. The output of that goes into the shop floor control system.

Do you look to MIS to express what needs to be done in these

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disparate parts of the organization?
MIS is more and more becoming an integral part of the senior management team. There has been a lot written about this, whether they are or whether they're not.

The MIS director cannot just be the technologist, acquiring technology based on price/performance — that's kind of narrow, it's just one element of the job. The MIS director is becoming involved in the business strategy of the firm because senior management says, "We've got to be more competitive." The CEO asks, "What is the value that I am receiving from my IS investment — one of the largest bills of the company — particularly as I look across the company, not just at you in the MIS department? I've got a lot of IS bills I'm paying in the 'do' functions out of their budgets."

That is the traditional question. The more recent question is, "Is that investment helping me be more competitive?" That is an additional element to efficiency and productivity. The minute that question is raised, senior management sees the need to wed the MIS function with other members of management. MIS has to be brought in on planning the business strategy of the firm.

Some MIS people are kind of territorial. They say, "I don't think I'd like IBM out there calling on the end users." Well, the facts are that Apple, Compaq, DEC, Hewlett-Packard and others are all calling on the "do" function. And the multivendor issue is the evidence of that.

MIS has an important role to play because most business solutions, once identified, drive cross-functional applications. The ordering system, engineering design, business production planning and shop floor control work off the same database.

The applications become co-related. Every time I say the applications are connected, user-to-user, or co-related because they require access to data — not data just locked up in the data jails, but where it's all available — then you are talking about the role of the MIS director. He is responsible for the network and, more and more, for the management of data within the firm.

Were you implying, when you listed the other vendors making calls on end users, that IBM was late in doing so — stuck with the traditional approach solely through MIS?
I think our traditional approach has been to deal with MIS. That has caused us over time to be predominantly a large-company, glass-house, large-systems organization. We're changing that through the restructuring of our lines of business to put equitable technology focus on all the elements I talked about. The restructuring of this marketing organization focuses attention on the trading areas and requires our representatives to use all their resources and business partners to meet user needs. All those changes were made to deal with the point of your question.

There is an end-user sale, the individual workstation; and there's a network sale; and there's a large-systems sale. They are integrated. We call it the integrated enterprise. You can take it in vertical cuts through a firm — the customer service solution, the inventory logistics solution, the engineering-design/business-plan/shop-floor solution.

At the heart of them are commonality in data and a relationship among a set of users. The MIS director has that functional responsibility to tie it together. The individual users want to be tied together. The individual users all want to have access to this data. Well who provides that service? Who helps them? The MIS director, in most companies.

Just as the MIS director is changing to better serve the user, IBM has to do that as well.
Absolutely.

But you are shifting so many people to sales from nonsales positions. How can they become part of the solution quickly?
Remember I said quality in the marketing process? And underneath that, we're talking about more industry education, technical education, product introduction and relationship with the marketing and development lines of business. You say that we have a lot of [new] people out there in sales. Well, first of all, what's selling today? I'm saying that selling is a person who is good at helping the customers solve a business problem, to help them manage change. It starts with that solutions orientation and industry specialization. They need to be trained in the particular industry.

We're making a tremendous investment, hundreds of millions of dollars, in training our field force in industry solutions and in giving them a better technical education. And, by the way, better technical education in cross lines of business products. How does the PS/2 work with the network? With the 3090? Cross lines of business.

So we're beefing up our technical education and support centers. Our support centers in the past have been primarily — well, "We do 3090s here," or "This is where we do the mid-range." No more. We're changing the support centers in 1989 so they can handle the array of products and systems integration.

We are utilizing the lines of business development people on assignment in the technical support centers across the lines of business, co-resident with some of our system integration people. And involving that support organization much sooner in the sell process, not waiting until some arrangement of equipment from the desktop to the network to the high end has been put together by the field.

From a salesperson sense, our emphasis is more on understanding the customer's industry, and the applications within that industry, and the "do" functions, and what their requirements are. The systems engineer has some of that orientation. They learn the insurance applications, for instance, but are more and more responsible for the technical aspects — this is how the OS/2 Extended Edition works. And we're doubling our technical education for systems engineer, doubling our investment over last year.

Now in all of this, we're using business partners. There are thousands of applications available that run on IBM equipment, and it's a real trick for the customer and ourselves — particularly the end users — to know what all is available to them.

We installed a system last year, and we're significantly expanding it this fall, called the National Solutions Center. It has more than 10,000 applications, and the vast majority are from others. They are categorized by insurance, manufacturing, many cross-industry. This allows the marketing team at the branch office to inquire and bring these things up on a screen and know if they're available from IBM or from Lotus, or Microsoft, or Borland, or whoever.

Speaking of relationships with other companies, how do you evaluate Steve Jobs' new Next Computer System?
He did one of the best jobs I've seen of describing the need for the Micro Channel. He described the problem that an advanced workstation using the old PC AT architecture or the Apple architecture has when you try to do advanced applications on the desk top. He pointed out where the industry is really headed in the '90s, and of course I'm in the audience saying, "Amen, that's what PS/2 is all about."

In my less-than-engineering/technical opinion, he has a machine roughly the equivalent of the PS/2 Model 70 — 25 megahertz, including the channel. With the smart cards that are coming for the PS/2, over 500 now coming on stream, you'll see a lot of that same capability on the PS/2 in 1989.

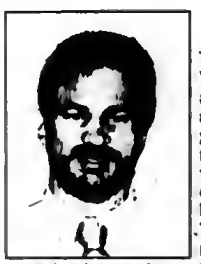
Now we'll compete against him, machine for machine. He certainly had a very select focus; he's smart in the way he's introducing that, as an education machine. Obviously, any computer of that capability has capabilities beyond education. But he's doing this a step at a time.

We're involved with him because we thought the software development platform, the ease-of-use interface, that he developed for us that we're putting on AIX is a real step forward.

Back to that question of, Do you think your products are superior or not, and how do you judge that?

If you say, "I judge it by ease of use," we're making a lot of investments to make our products easier and easier to use. There is a long way to go. The industry is really just at the beginning. •

User View



Michael Eastridge
Operations Analyst
Pacific Telecom, Inc.

We are working in a rapidly expanding and complex data processing environment on which we have come to depend for our business survival. We need to control much larger and faster computer systems.

To better manage our expanding data center environment, computer services has formed an operations automation team whose overall goal is to improve service to our customers.

Key needs we must address include the following:

- Responding to overwhelming message rates that no human can comprehend or absorb.
- Addressing increased operator intervention required to handle print, fiche and tape processing.
- Meeting escalating system availability requirements.
- Speeding problem diagnosis, alerting and recovery.
- Monitoring an entire system configuration.
- Automating the approach to recording system outages and problems.

But we cannot continue to increase operations staff at the recent pace — the number of operators has doubled at Pacific Telecom in the past four years.

One IBM solution calls for enhancements made to MVS/MPF for console message suppression, deletion or automation. Another is 3480 tape drives with attached autoloaders to automatically handle scratch tape mount requirements. A third is Netview, which we will use as our primary tool for automation even though it was designed and installed to manage our Network Architecture.

Netview can handle tasks such as automatically replying to Write To Operators and Write To Operator Replys, monitoring system tasks and hardware and generating alerts. It allows us to code C lists to monitor and respond to particular messages or restart failing system components. It also can interface with Information/Management to create problem records automatically.

As we thrust into the future with our automation project, researching tools and software produced by other vendors is a very strong possibility if IBM cannot address our needs.

Our future expectations include IBM providing:

- A resolution to tape handling problems, perhaps through robotics.
- An expert system.
- Education on products when they are released, especially in the case of automation products.
- A more user-friendly interface between Netview and automation to alleviate difficult coding techniques required to automate an entire computer system.
- A timer function within Netview with the ability to trigger C lists from the message table at a specific time.
- A less cumbersome way to test automation within Netview.
- Ways to monitor and restart Netview/Automation in the case of failure rather than running a second Netview.

If we are to rely solely on IBM to meet our automation needs, we must see efforts directed toward other automation roadblocks that deal with non-IBM equipment. We must see automation of the fiche process, which involves both printing and duplicating, and an automation link between Netview and other types of equipment, such as Digital Communications Associates, Inc. products, VAXs and Honeywell, Inc. products.

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The Perils of Redeployment — or, Starting from Scratch

TOM PAYNE

Some workers are concerned that the company is maintaining its no-layoffs policy at the price of flexibility and dynamism

BY STEPHEN BANKER

News that IBM reorganized itself again this year didn't disturb Doug Tarbet, a data center manager at B. F. Goodrich Co. in Akron, Ohio.

"I've established personal relationships with people in IBM. When they make a change, I just ignore their organizational chart and talk to the people I'm familiar with," Tarbet says.

But IBM's most recent moves are perhaps the most dramatic ever. They represent a fundamental change in the way IBM does business, according to Chairman and Chief Executive Officer John Akers. The reorganization includes the following changes:

- IBM shifted an estimated 20,000 employees to different jobs within the company. The majority of them are moving from manufacturing and staff positions to marketing and service.
- Another 15,000 employees snapped up IBM's lucrative early retirement offers, thus enabling the company to reduce its work force without breaking its no-layoffs policy.
- To bolster revenue, IBM transferred key product design, manufacturing and marketing decisions to five new independent business units.

MIS managers are just beginning to feel the consequences of these changes.

"Last year, when IBM announced 'The Year of the Customer,' I definitely noticed a difference," says John Putney, executive vice-president of office and information systems at Teachers Insurance & Annuity Association of America's College Retirement Equities Fund in New York. "The salesman paid more attention to us, and he got us more support.

"This year, there has been a continuation of that. We still have a [main] salesman, but he has more people supporting him," Putney says. "Most of the help is for planned conversions, different operating systems and things that are of a technical nature."

According to Greg Blatnik, an IBM analyst at market research firm Dataquest, Inc., there may be more people in the field, but their value to the user is questionable.

"The person in front of the customer, the new person in the blue suit, is probably not up to the standard of someone who has been there doing it for some time," he says. "The changeover is a difficult situation. They might as well say they're going to make you a welder, because the skills are that different."

The movement of workers from the background to the front line is a steady flow. For example, in 1987, the company increased the size of its sales force 10% in the midst of the overall reduction in staff.

Will this slimming down continue? "Yes," says Patrick McArdle, national sales manager for IBM educational systems in Atlanta, "but only through natural attrition. Those who leave or retire won't be replaced unless they're salespeople. We'll always replace salespeople."

Redeployed workers are retrained by IBM — sometimes for short periods, sometimes up to a year. The schooling naturally takes longer when the individual is switching fields. A redeployed manager who declined to be named was asked if he expects to make more money in his new sales position. "They tell me it will be there some day," he says. "But for the first year, I'm in the training mode."

Redeployed employees also must often continue their career at the bottom of a new heap. Once the new person gets into the field, he becomes part of the the normal promotion routine.

According to one experienced salesman, "Two to four years after you become a sales rep, you're promoted to account rep. Then, maybe four more years later, you're moved up to staff. And then, a few years later, back in management. If you're good, you don't spend more than a couple of years with a particular account."

Francis McDonough, deputy commissioner of information resources management at the U.S. government's General Services Administration, disagrees with IBM's approach. "Good salesmen are people who have spent their whole lives at it," he says. "If a guy drops into sales late in his career, I don't think he can be a salesman."

Such changes often involve relocation — moving families, finding new homes, switching schools for young children. IBM has a history of being gen-

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Banker is an independent writer based in Washington, D.C., and is currently the computer columnist for *Government Executive* magazine.

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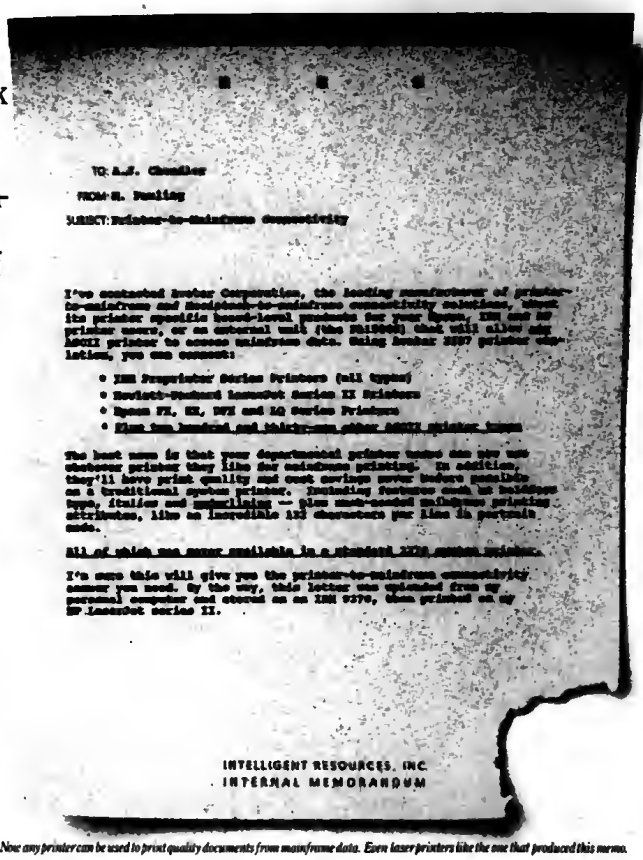
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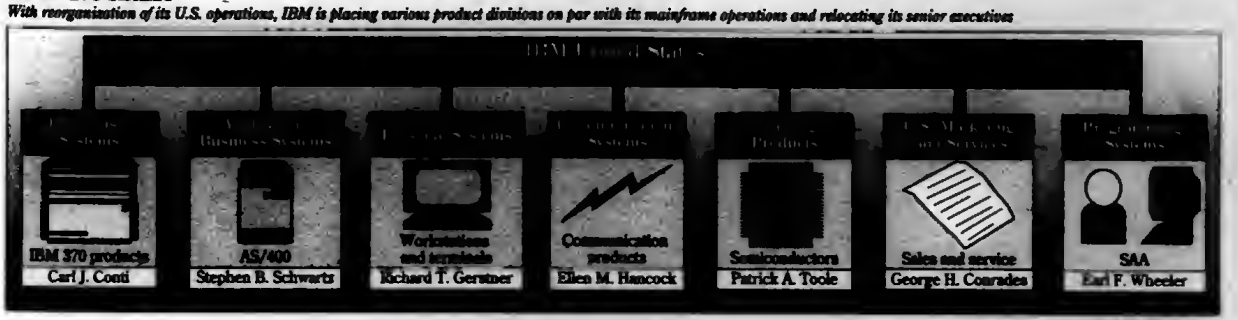
Executive shuffle

With reorganization of its U.S. operations, IBM is placing various product divisions on par with its mainframe operations and relocating its senior executives



CW CHART: AMY J. SWANSON

erous with such expenses.

"Basically, IBM sends the people who are being redeployed to the same training that the entry-level person receives," one former employee says. "To be competent in marketing, you have to learn the product line. The person from the plant may know one piece of equipment very well. He may know the numbering schemes, the personality of IBM. In that respect, longtime IBMers have an advantage over someone just coming from college."

There are disadvantages in this system that may tell in the long run. Recent university graduates are often eager to work for IBM. But that opportunity is not available if the company continues to redeploy and retrain the older, tenured people.

No young blood

Some employees are concerned that IBM is maintaining its no-layoffs policy at the price of the flexibility and dynamism of the company.

"Some of us think the policy of no firing is actually a weakness," says a current employee. "With redeployment, we can't hire from the outside. People must be promoted from within."

Blatnik believes the consequences are such that the no-firing policy is finally at risk. "There was a buildup of staff about eight years ago that went too far," he explains. "They had great needs for new people. When conditions changed, IBM was stuck with both the employees and the policy. Early retirements and redeployment are the correction."

Who, then, are the people being winnowed out? They are, according to McArdle, "the staff people, the number-crunchers, the analysis people. They may have been doing sales analysis, business practices or business policy. These jobs are important, but they weren't helping sales. Our No. 1 objective is to do what's needed to provide more customer support and service."

"Face time" is a striking IBM buzzword that refers to the amount of time a salesman spends with his customer rather than at his desk. Just a couple of years ago, analysts put the figure at 30%.

According to Richard Holt, a professor of computer science at the University of Toronto and former head of the computer systems institute there, the redeployment is an attempt by IBM to retain its leadership. "When innovative technology is mentioned," he says, "computer scientists no longer say 'IBM.' "

Dataquest's Blatnik concludes, "IBM has to reduce the head count further, and all the redeployment you can imagine is not going to accomplish that." ●

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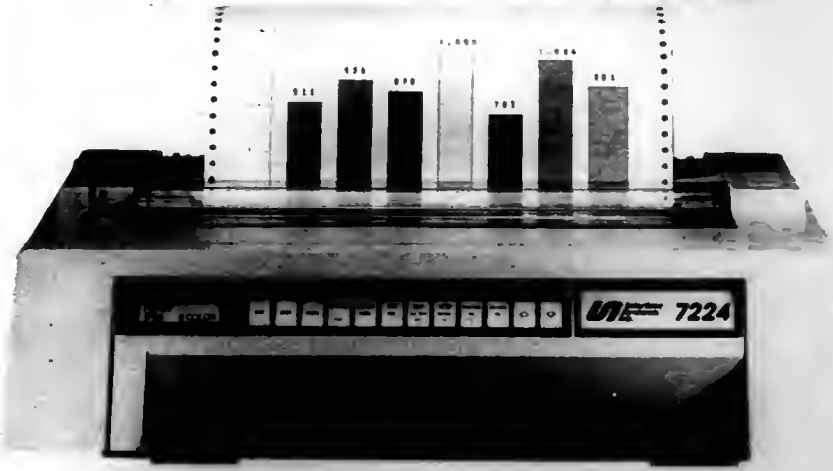
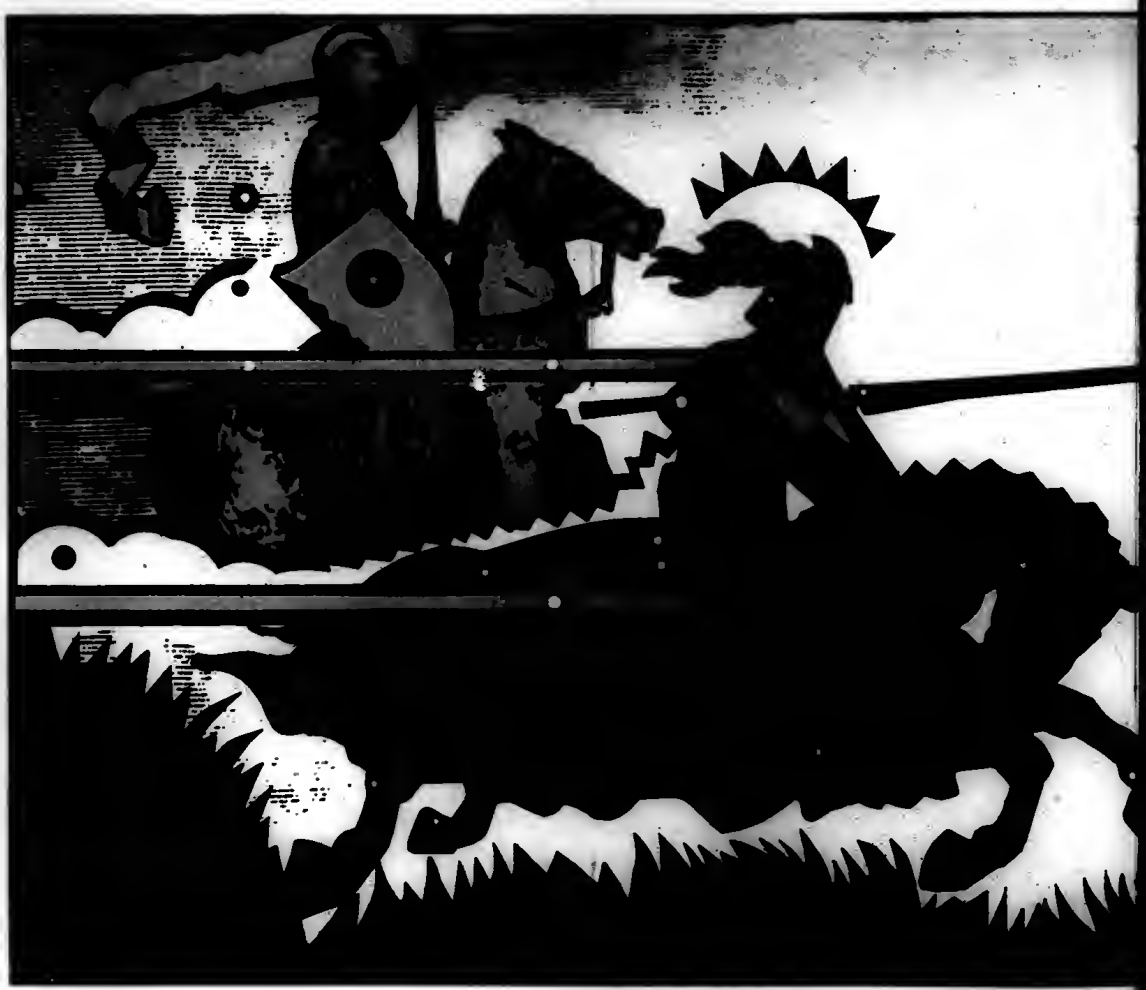


Fresh Forces Charge into Software Fray

With SAA riding point, IBM is poised to mount its most unified effort yet



BY PAUL HESSINGER

IBM often charges into software, trumpets blaring and banners waving, only to seemingly lose interest in the new strategy after the fanfare fades. The chief example of this approach is Systems Network Architecture. Though SNA endures well after its introduction in the early 1970s, the single greatest obstacle to its acceptance was IBM itself. The company's multifaceted organization did not reflect the ultimate implications of SNA.

Something similar occurred last year when IBM introduced the Application Systems Division. Then seen as IBM's true software point man, the division already seems to be falling in importance, left under marketing after the recent reorganization.

Hessinger is vice-president of research and technology at Computer Task, Inc. in Buffalo, N.Y.

But with the restructuring, there are indications that IBM may at last be serious about software beyond operating systems and database management systems. Under IBM USA, new lines of business were created — three of them carrying major software thrusts. The Communication Systems Division is the guardian of SNA. Marketing and Services promotes IBM's new Enterprise Systems Architecture, which encompasses MVS/ESA and includes third-party arrangements through the Application Systems Division and s Systems Integration Division.

The most powerful new software arm is the Programming Systems Division, charged with implementing Systems Application Architecture (SAA). Key products such as DB2, SQL/DS and CSP fall within this structure. SAA is clearly s dominant, driving force within IBM.

Programming Systems is headed by Earl Wheeler, s vice-president code-named "Programmer 1," reflecting his length of service as a technician for IBM and the respect be commands within the company. Wheeler is the Czar of SAA. Even development labs not within his direct control understand the need for and value of SAA compliance.

The successful implementation of this new set of strategic efforts will depend on IBM's own focus on competitive advantage. IBM must offer clearly superior products with levels of service and support that allow the firm to control its operating costs and — directly as well as indirectly — drive revenue growth.

Within this 350,000-employee company, there are dozens of strategic projects, each employing hundreds if not thousands of developers. The simplified but accurate view of IBM's organization increasingly reflects the potential synergy of the key architecture.

The foundation

The major components of IBM's enterprise strategy include s viable system hardware superstructure — Enterprise System 3090s and 9370s, Application System/400s and Personal System/2s. More than simply similar product designations, these strategic IBM hardware platforms are part of s set of layered computing solutions within the product lines.

Communications follows on the heels of hardware with an infrastructure that provides SNA and ISO Open Systems Interconnect (OSI) connectivity. In addition, the strategy provides for s data management structure resting on s DB2 foundation with consistent interfaces (for distributed databases) between the OS/400 DBMS, the OS/2 Extended DBMS, the AIX DBMS and SQL/DS (the "VM DBMS").

Finally, there is the application framework — SAA — that defines discrete building blocks such as SQL and LU6.2 for application delivery and enabling. This is referred to as an Application Development Environment.

In 1989, with few exceptions, IBM will focus on solidifying the understanding — within IBM and in the user and vendor communities — of key architectures such as SAA. Both explicitly and implicitly, IBM is articulating its vision of information systems in the 1990s — enterprisewide computing with increasing integration and sharing among corporate, departmental and workstation applications.

The most strategic IBM products will be woven more tightly into the fabric of the enterprise architecture concept. Last month's "Distributed DB2" announcements are clear evidence of this strategy, with at least one further layer of the distributed database strategy to be unfolded in 1989.

IBM's participation in standards activity will intensify, and not just for cosmetic reasons. For example, the participation of IBM and Digital Equipment Corp. in the Open Software Foundation signifies the rivals' desire to lay aside intense competition with each other for s moment to consider the merits of open architectures for enterprisewide information systems.

Unix is an example of how strategic technology can be easily mistaken for architecture. Unix is not an architecture but an important enabler of essential elements of any vendor's or corporation's strategy for enterprise systems — portability, data sharing and so on. Sun Microsystems, Inc. and AT&T are driving Unix further into the marketplace — not as an SAA alternative but rather as s potent piece of technology that facilitates each vendor's more general strategies.

True, IBM's product position on Unix (Posix? AIX?) is not crisply defined, but Unix's role overall in IBM's strategy is a given.

By must indications, it appears that 1989 will be s relatively mundane year for IBM product announcements. Perhaps the one exception, probably earlier in the year than later, will be the definition of the development environment that will enable the practical implementation of the Enterprise vision. The Application Development Environment will be as far reaching in its implication as any IBM direction in the past 10 years. It is the very essence of the Enterprise Strategy.

In general, 1989 will be s watershed year for the information industry. Meaningful standards will be widely embraced, and the need for still others will be pragmatically explored. Ever more powerful processors will emerge. Communications infrastructures will be fortified as Integrated Services Digital Network matures, and heretofore conflicting network architectures — for instance, SNA and OSI — will begin to merge.

Sophisticated software technologies, such as computer-aided software engineering and distributed databases, and paradigms, such as knowledge-based systems and object-oriented processing, will provide orders-of-magnitude improvements in the economics of application development.

All in all, not s bad time to be in the computer business — for vendors and users alike.

New partnerships

The stakes for vendors large and small is to expand with this ever broadening spectrum of technology. IBM's Enterprise Strategy for the '90s indicates changes in the company's organization that reflect the depth and breadth of IBM's recognition that comprehensible, implementable hardware, software and communications architectures will be the keys to success.

To achieve this success, IBM is clearly willing to go beyond s traditional not-invented-here policy. This change is most easily seen in several key third-party relationships. Arrangements with Intellicorp will enable IBM to offer one of the most powerful approaches to knowledge-based systems when its Knowledge Engineering Environment becomes available; it is scheduled for December 1988.

In s strange-bedfellows situation, even Steven Jobs found it palatable to license the look-and-feel front end of his next-generation workstation product to his once archnemesis.

In more mainstream areas, IBM has formed s relationship with Transform Logic Corp. whereby IBM's CSP, which the firm calls "the strategic model of the SAA generator product," will become state-of-the-art in development technology by incorporating unique and powerful components of Transform Logic into CSP. In this relationship also rests the key to unlocking the door into IBM's long-awaited repository product.

It cannot, however, be overlooked that not all relationships with IBM are beneficial to everyone. IBM's attempt to market Alcorp, Inc.'s Intellect simply failed. Hogan Systems, Inc. has clearly not found gold at the end

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of the rainbow in its venture with IBM to market Hogan's banking applications.

Perhaps what was lacking in these two cases was a driving customer need for the technology that was the focal point of the relationships. A natural-language query tool and integrated banking systems — great solutions, but what's the problem?

The continual sharpening of the focus of the appplication solutions business units — the Systems Integration Division and the Application Systems Division — as leading forces illustrates that IBM understands it cannot just sell technology; it must provide solutions.

Using a single technology development as the focal point of IBM's organization and product architectures runs a grave risk of oversimplifying. Nonetheless, the genesis of many dimensions of IBM's Enterprise Strategy can be seen in the June 1983 emergence of the industry's premier relational DBMS technology, DB2.

DB2 provided a common technology focal point for many IBM business units. It almost immediately reestablished the viability of large systems for centralized data management; at the same time, it created the longer term need for true distributed database facilities that would sustain the voracious appetite of Intel Corp. 80286 and 80386 workstations with a true hunger for data.

DB2 as a strategic IBM initiative has changed the competitive dynamics for hardware and software vendors alike.

One can only surmise what the last five years would have been like had DEC responded directly to DB2 instead of creating an opportunity that vendors such as Oracle Corp. and Relational Technology, Inc. immediately grasped. Or what would have happened if the shining star of the software industry in the early 1980s, Cullinet Software International, Inc., had been able to anticipate that DB2 was not just a harbinger of changing IBM strategies but an indication that MIS implementations of the later '80s and early '90s would break the mold of mainframe- or PC-only applications.

AS/400 software

Another more recent example of things to come from IBM is the software aspects of the Application System/400. In the user interface and communication and programming protocols — that is, SQL — of AS/400 and its operating system, OS/400, there are hints of the ultimate magnitude of SAA. It will be an architecture that supports application portability, dynamic data sharing and, ultimately, heterogeneous computing configurations.

However solid DB2 and SAA are or will be, without organizational focus they could have been beset by the same inertia within IBM that stymied the evolution of SNA.

Specific key IBMers emerge as architects of IBM's overall strategy. In the data systems architecture area, Norris van den Berg, among others from the Santa Teresa, Calif., laboratory, have the charter to maintain consistency between the key DBMS products. Van den Berg directs a Relational/SQL council with key technical managers from the labs in Toronto and Austin, Texas, and other labs involved with DBMS technology.

Careful examination of the last three or four sets of DB2 announcements indicates that the consistency between these products that will be required in the coming (sooner than we may believe) world of SAA distributed database applications is being established.

Santa Teresa and other labs have become more accessible to both customers and third-party vendors. Applied Data Research, Inc. received technical support from Santa Teresa when it decided to port Ideal, a powerful application development tool, to the DB2 environment.

Clearly, the announcement last year of SAA was a milestone in the shaping of the organizational and architectural dimensions of the Enterprise Strategy for the '90s.

But SAA is also an example of how IBM must maintain and continuously refine its organization so that it explicitly reflects key architectures.

With DB2, IBM created an interesting problem for itself. Gone is the FUD factor associated with major IBM announcements. IBM is now faced with the FUDGE factor: Fear, Uncertainty, Doubt *and* Great Expectations. It is particularly acute with SAA. In 1989, IBM will have to move SAA out of the conceptware stage (as many in the industry view it) and into a viable enterprise application architecture.

But IBM is also consciously reaching out to third-party software vendors in an effort to help them understand the implications of SAA and fuel the drive toward mutually beneficial business opportunities.

IBM's customers are also being drawn into the SAA fold. "Full disclosures" of SAA are being made to a growing number of large customers, with the IBM hope and expectation that detailed criticisms will be provided. At least 50 large organizations worldwide — 15 in the U.S. — have invested significant time and energy in these exercises.

In 1989, SAA should blossom into specific products. The most often overlooked dimension of SAA, common applications, might be the first to benefit with the emergence of significant integrated office systems products.

Finally, SAA will begin to evolve from an application delivery architecture to an application enabling environment. As it evolves, so will IBM's new software efforts — no longer disjointed flashes in the pan, but part of a broad organizational strategy. •

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The Changing Role of Large Mainframes

Big boxes will be a smaller — but still vital — part of IBM's future

BY SAM HARVEY

The tidal wave of corporate networks is finally sweeping over the last bastion of centralized computing — the IBM mainframe. Long the central focus of the company's operations, the mainframe is being repositioned from a singular entity to a key player in an enterprisewide communications network.

Where once only dedicated terminals could access mainframe data, users in the late 1980s are creating a new level of systems. They are accessing data via applications that extend across a network. IBM's response to this development is an all-encompassing strategy built around Systems Application Architecture. SAA assumes the complete integration of all hardware and software across an enterprise.

IBM's objective is to develop a consistent design that supports the entire organization with available access across families of computers and a variety of distributed databases that are interlinked with its Systems Network Architecture (SNA).

To assess the implications of IBM's new mainframe direction, it is necessary to understand the architecture of the entire network. The IBM strategy encompasses five related areas: hardware architecture, operating systems, database architecture, application development and network communications. There are literally hundreds of subsystems within this architecture.

In the past, compatibility was limited to I/Os and the need for communication standards between systems. Under the new strategy, the applications will transcend individual machines. The mainframe is therefore not just a reservoir of data or processing cycles; it becomes an integral part of shared applications.

Harvey is president of Business Research, Inc., which provides technical and management services to Fortune 100 companies and is based in Stowe, Vt.

Hardware architecture

As distributed systems develop and the number and power of microprocessors increase, 80% of the processing cycles are out in the network, and only 20% are in the central processing centers.

The large number of intelligent terminals and personal computers is generating an increasing volume of transactions that require on-line processing. This demand creates a need for database systems that can process high transaction volumes (100 to 1,000 per second).

A growing number of distributed databases are part of applications that extend across the enterprise and between levels of computer systems, adding requirements on the central processors. In addition, there is a demand for very high computation power to solve complex engineering and business problems. Finally, the current application load continues to grow.

To meet these requirements, the central utility processor must be modular and flexible to match the system to the demand. These network requirements are key factors in the design philosophy behind IBM's largest mainframes, the 3090s.

The original 3090 line came out in 1985 with four models: the Models 150, 180, 200 (with two processors) and 400 (with four processors). Next, the 3090 E line was announced, with nine models; the top of that line had six processors. Last summer, the Enterprise System/3090 S line was released. The 3090 S line has 10 models, with up to six processors in the Model 600S.

The latest systems feature an enhanced design with wider paths between central processing and storage, additional fast-path capabilities, high-speed buffers and faster computing. A high-speed vector facility is offered for the 180S to 600S machines. This facility allows a 40% increase for numerically intensive computing. Central storage is also expanded to 12M bytes.

Within these configurations, a user can gain a 15-fold performance increase over previous mainframes, with more than 60 upgrade possibilities. Considering current system requirements, it is clear that the 3090 approach is meant to fulfill a very definite objective.

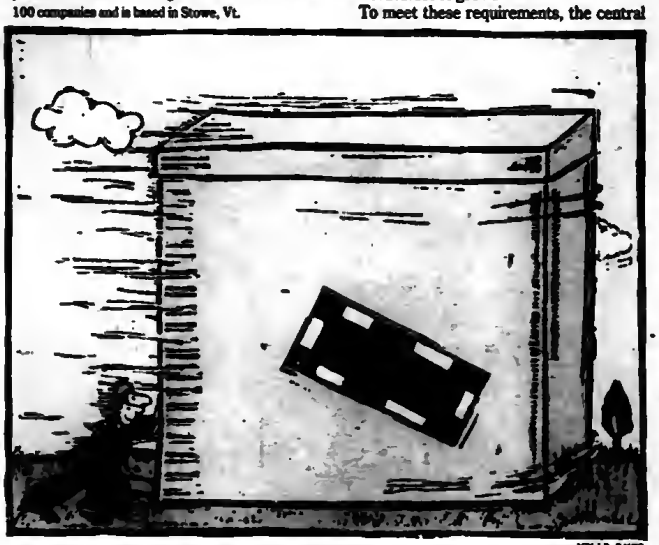
The questions most asked by midsize and small companies are: "That's fine for the big company — but how does this affect our operations? We can't afford this power. How will we be able to use an entire system developed across families of small computers and these large central processors?"

IBM's answer is to run an internal network with systems at the mid-range, mini and PC levels and buy the large processing power from an outside data utility as required. To provide this capability, IBM is building a service network through its U.S. Marketing and Services Group. The network provides access to large processors from 300 cities in North America, Europe and Japan. Other large central utilities such as Electronic Data Systems Corp., Boeing Co. and General Electric Co. can offer similar support.

System architecture

IBM's operating system support is based on a family of systems, including OS/2 at the PC level, Application System/400 at the distributed level and MVS/ESA and VM at the large-system level. No longer can these be thought of as discrete operating systems. All are being designed to handle cross applications and will feature a common interface to the user.

In the large-system area, MVS/ESA is considered the base for systems growth. Applications of the future demand giant quanti-



NELLE DAVIS

ties of data. ESA is being engineered to handle these volumes at high speed. It will possess powerful new addressing capabilities and expanded storage. These capabilities are designed to provide the power to support the other levels of processing across the network. It is projected that ESA will improve software performance 30% to 40% and improve CICS by 50%.

ESA will be put on the IBM mid-range systems, extending the possibilities to integrate distributed operations. In addition, intelligent workstations will be developed as the future interface to ESA. Functions such as presentation services and the dialogue manager will move into the workstation and cause restructuring of the large central host.

AIX, IBM's Unix, will be implemented across all three IBM platforms — PCs, AS/400s and 370s. It will be associated with SAA but will not be a part of it.

VM will continue to be an integral part of the operating system architecture. There are no plans to merge VM and MVS. Each will be enhanced but not replaced.

We can no longer think of discrete operating systems. Although separate, these systems will operate as one and look alike. There are carefully considered design reasons behind this strategy.

Database strategy

The most significant change in large processors is in the database area. For the last 15 years, the IBM mainframe has been a disappointment as a transaction processor. At 2 to 5 transaction/sec., it was fine; at 15, it died. IBM Fastpath struggled at 50 transaction/sec.

The major airlines concluded that the Airlines Control Program was the only game in town for high-volume transaction systems — those running over 100 transaction/sec.

Then, early this year, IBM reported benchmarks for both DB2 and IMS producing very high transaction rates. DB2 was benchmarked at 438 transaction/sec. IMS, which could not handle high volumes, was being benchmarked at 1,000. A change of this magnitude is obviously the result of carefully planned engineering, which includes these elements:

- Cached storage control to buffer I/O.
- Concurrent data transfer on multiple data paths.
- A larger number of actuators, or paths to data.
- Transaction handling balanced across multiple processors under ESA.
- Improved pathing connections — fewer instructions per path.
- About 4.5M bit/sec. data-transfer rates on channels to memory.
- Studies of I/O density per gigabyte of storage to determine placement of data.
- Performance improved by segmenting data, matching higher performance hardware to data files with higher access requirements.

The application of these techniques changed the relationship of the central large mainframes to the distributed system they support. Already, several large financial companies are adjusting their network plans to take advantage of these capabilities; without them, the large machines could not service the on-line requirements of large networks.

SAA is the core of IBM's strategy. Complete integration of all hardware and software is the clarion call. Distributed processing is the architecture with a powerful central processor providing control, coordination and logistical support to all of the systems in the network. Within this framework, SAA programs include common applications across systems and presentation managers.

They will also feature extensive use of relational databases, intelligent workstations tied into large CPUs and available access across families of computers.

There will be significant new development tools accessible through the network, advanced graphics tied into large, central optical storage systems and libraries of applications available to distributed systems throughout the network.

Finally, there will be a common repository, directory and inquiry, with SQL as the core and the central processor.

The large central processor is integral to implementing all of these strategies. IBM estimates that 50% of the revenue in the information processing market will come from application software.

Future developments

The framework of IBM's application and network architecture is clearly in place. It is consistent with a network "anatomy" that is evolving throughout the industry.

The levels of processing within this framework will continue to increase in power and decrease in cost. The central utility processors will be in the range of 600 million instructions per second to 1 billion instructions per second and beyond, consisting of multiple parallel processors that can be expanded on demand to meet measurable and predictable service level requirements.

IBM officials recognize that the magnitude of these systems extends beyond the scope of their company, as powerful as it is. A statement from Carl Conti, vice-president and general manager of IBM's Enterprise Systems Division, sums up IBM's position.

"We are looking for partnerships," Conti said at a conference in Palm Springs, Calif., last spring. "It would be naive to believe that all of the pieces required will fall easily and immediately into place. It has taken over 35 years of development to reach the point where we thought we were in the early 1950s, when computers were first developed. This time, however, the power to do the job is available." ●

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Getting the PS/2 On Track

BY PAUL FREIBERGER
and DAN MCNEIL

IBM is finding its efforts to supersede the original Personal Computer with a new line as difficult as Coca-Cola Co.'s struggle to replace its original recipe with "New Coke."

In both cases, many users prefer the taste they are accustomed to.

Faced with customer resistance to the Personal System/2, IBM brought back a personal computer sporting an AT-compatible bus in September to halt a skid in market share, just as Coca-Cola reintroduced old Coke.

Behind IBM's struggles in the PC market is a strategy that subordinates personal computers to large systems. "IBM's drive with the PS/2 is to drive mainframe demand, not necessarily to sell PCs," says Robert Simko, executive director of the International Technology Group (ITG), a consulting firm in Los Altos, Calif.

Indeed, the Micro Channel Architecture (MCA) of IBM's new generation of personal computers is an element of a wider strategy that calls for a common software architecture across the company's diverse hardware lines under the Systems Application Architecture.

"The problem is that IBM doesn't understand the personal computer industry. Instead, they worry about the $25 million mainframe division. It is a failure to address the concerns of the user," says Stewart Alsop, editor of "PC Letter," an industry newsletter.

Yet despite unforeseen challenges, PCs may still be IBM's greatest opportunity. And the reason can be found in the changing pattern of computer use.

"Mainframe and mid-range sales are flat," says Clare Fleig, director of research at ITG. "The PC market is one of the few areas of growth remaining."

As a share of IBM's total sales, personal computers rose from 13.8% in 1986 to 14.6% in 1987 and should reach 15.3% in 1988. However, IBM is ensnarled in difficulties with its newest line of 32-bit PCs, the PS/2. The company says more than three million PS/2s have been shipped since they debuted in April 1987. But behind this impressive figure lies three major problems:

- **Lost market share.** In mid-1987, IBM terminated the 16-bit PC AT, thus spurning the low-end market. However, the low end has grown swiftly, reducing IBM's share. The introduction of the PS/2 Model 30 286, an AT-compatible personal computer, is aimed at slowing the loss.
- **A rival standard.** IBM faces a broadside challenge to its proprietary PS/2 MCA. The Extended Industry Standard Architecture (EISA) is being developed by a group composed of IBM's leading competitors. The other companies were provoked to develop an alternative to IBM when the company introduced high license fees for the technology and failed to convince users of its benefits. The PS/2 is also incompatible with earlier add-on boards. If the uprising succeeds, IBM could lose the standard for the new generation.
- **A flagging workstation.** IBM must breathe life into sales of its RT PC workstation. This market is growing very rapidly, but IBM's share remains slender.

A miasma hangs about IBM in the PC arena. Though it remains a giant presence, observers see the company as static and unresponsive.

"Despite IBM's size and power in the business, it doesn't seem to be going anywhere," Alsop says. "Inability to generate momentum is a serious problem for IBM. Clearly, Compaq, Apple and Zenith have momentum. That indicates something is wrong."

Observers place much of the blame on the fact that the PC division at IBM is now fully integrated into the larger company. One result may be slower reflexes. "When IBM's PC effort was an independent business unit, they were much more flexible and could respond to changing market conditions," says Bruce Lupatkin, an analyst at Hambrecht & Quist, Inc. in San Francisco. "Now that it's in-house, they're stifled by the standard bureaucracy, and product cycles are much longer."

IBM's three main difficulties — loss of market share, a rival standard and feeble workstation sales — all stem from a less-than-deft approach to the industry. The market-share problem harks back to the original IBM PC. When IBM unveiled this machine in 1981, surprised observers found it used parts off the shelf and an open architecture anyone could copy.

The subsequent cloning both helped and hurt IBM. It guaranteed that the original PC would become the 16-bit standard, ensuring profitability and long life for the line.

However, this approach eventually led to erosive competition from the makers of compatibles, which either sold machines equivalent to IBM's at a lower price or, like Compaq Computer Corp., provided better machines at a similar price.

IBM's unit share of the compatible market dropped from about 75% in 1983 to about 40% in 1986, and its unit sales fell from 6.5 million in 1985 to 4.8 million in 1986, according to Dataquest, Inc., a San Jose, Calif., market research firm.

Puzzling move

Soon after IBM introduced the PS/2 in April 1987, it bowed out of the 16-bit AT market, leaving behind the architecture that made the original PC so successful, even though the AT remained a solid seller. Analysts theorized that IBM wished to stress its commitment to the PS/2 and encourage users to switch over.

Yet the move was ultimately bewildering. IBM simply lifted its net from the stream while the fish were running. Though IBM's AT was dead, the compatibles fished on, healthy and hungry for market share. Since the low end was outselling the high, and since the PS/2 did not spur runaway demand, IBM's percentage of the market waned further.

"IBM has lost market share in both units and dollars," says Stella Kelly, an analyst at Infocorp, a market research firm in Santa Clara, Calif. "Customers are still buying AT-class products very strongly."

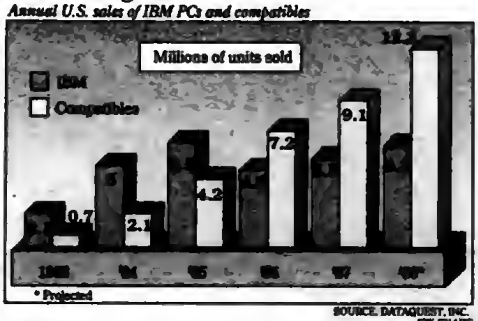
In 1987, IBM's unit sales were 37.7% of the compatible market; for 1988, the projected figure is 33.9%. After repeated avowals to the contrary, IBM in mid-September introduced the AT-compatible PS/2.

"While our Micro Channel

Freiberger, based in San Francisco, and McNeill, based in Culver City, Calif., are co-authors of *Computer Sense*, published by Bantam Books in 1985.

IBM's falling PC share

Annual U.S. sales of IBM PCs and compatibles



SOURCE: DATAQUEST, INC.
CW CHART

machines are growing with or faster than the industry," says IBM spokesman Scott Brooks, "we were not doing quite as well in the low end, which is the fastest-growing segment of the PC market."

The new machine, which lists for $2,595 with a 20M-byte hard disk and $1,995 without, remains more expensive than most compatibles.

Richard Shaffer, editor of "Technologic," an industry newsletter, thinks it will do well. "Even at list price, it's about 25% above the price of comparable clones. Retailers will discount it. And the IBM name alone is worth 15%. Why buy an Epson, why buy a Hewlett-Packard, why buy a Leading Edge, if you can buy an IBM at the same price? I think it'll switch a lot of customers back into the IBM camp," he says.

Not all agree

Others question the strategy. Lawrence Harris, a securities analyst with Bateman Eichler, Hill Richards in Los Angeles, says, "It might help, but by deleting Micro Channel from their lowest priced 286 product, they've admitted that it's not a necessary feature. So an alternative move would have been to cut the price on the Model 50 and extend Micro Channel to a lower price point."

As a result of the AT snafu, some analysts believe, William Lowe, president of IBM's Entry Systems Division and the man who terminated the AT, was recently passed over for promotion to head IBM Personal Systems.

IBM's second headache may be harder to cure. On the very day IBM unveiled its AT-compatible, a consortium of powerful PC companies announced they were developing an architecture to compete with Micro Channel. In many ways, Micro Channel was a reaction to the open architecture of the orginal PC line.

For years, IBM watched the compatible companies copy its design and turn it against them, cutting into market share. Hence, for the PS/2, IBM designed Micro Channel, a proprietary bus. No one can use it without paying IBM a licensing fee.

Any proprietary system is a risk. It is harder to create, but once established, it yields a steady flow of cash and no one else can tap into it. In contrast, an open architecture is easier to launch. Though it leads to competition down the road, it can also make the road possible.

"I'm not sure IBM realises how important cloning is to the success of its system," says Tim Bajarin, an analyst at market research firm Creative Strategies Research International, Inc. in Santa Clara, Calif.

Since PS/2 debuted, only Tandy Corp. has issued a compatible. A second company, Dell Computer Corp., is holding one in the wings, unreleased. Other companies are reportedly developing PS/2 compatibles but are less likely to issue them since IBM's hike in licensing fees.

Tandy's machine is selling poorly. "It's not anywhere near the demand for the AT bus architecture," says Michelle Ryan, a Tandy spokeswoman. "The corporate market isn't ready to throw out the investment they have in the AT-architecture machine."

IBM is failing to persuade buyers that Micro Channel provides a significant advantage over the AT. "End users don't perceive any tangible benefit to Micro Channel," Kelly says.

IBM is promoting Micro Channel by touting unspecified boons the user will enjoy in the future. "IBM is suffering because they made a grievous tactical error thinking they could sell PCs the way they sold mainframes — on the promise of fussy benefits in the future," says analyst Lupatkin. "Personal computer life cycles are sometimes six months, so you can't sell products on the promise of features a year away."

The PS/2 situation created a dilemma for other PC makers. They could either follow IBM, pay high fees and gamble on a line without strong market appeal or set out on their own.

In mid-September, a consortium led by Compaq announced its new Extended Industry Standard Architecture. The group includes some big names: Compaq, Hewlett-Packard Co., Tandy, Zenith Data Systems, AST Research, Inc., NEC Corp., Ing. C. Olivetti & Co., Epson America, Inc., Wyse Technology, Inc. and Intel Corp.

It is a major rebellion. Together, according to an estimate from the market research firm Gartner Group, Inc., they already outsell IBM's personal computers three to two.

EISA is a full 32-bit architecture aimed at supporting the most powerful Intel microprocessors, the 80386 and the 80486 (expected late next year). EISA will have two main advantages over Micro Channel: full compatibility with the earlier line of PCs and open architecture.

The consortium is also receiving active support from Microsoft Corp., the software giant that wrote the operating system for the PS/2. The participation of both Microsoft and Intel, which makes the PS/2 chips, is seen as legitimizing a computer line.

Even IBM was invited to join the consortium. It declined. "IBM's feeling is that the world really doesn't need two advanced buses," Monahan says.

Of course, EISA is not a sure winner. Its first computers will not appear until at least late 1989. Intel will offer chips for EISA in the second quarter of 1989, says William Maxey, general manager of its peripherals and components group.

Working on the standard

"We think we'll have products for it by the second half of next year," says William Johnson, marketing manager for personal computers at HP. "We spent a lot of time talking with Compaq and put some engineering resources into developing the standard itself."

IBM's third problem is not as serious but is nonetheless vexing: It must bolster its RT workstation. Technical workstations are among the fastest-growing segments of the market. As more PCs are produced with 80386 and 68020 chips, the same chips found in workstations, they will be a greater force in the workstation market. (Most workstations, however, use the Unix operating system.)

So far, though, the RT has captured only 3.8% of the $2.5 billion workstation market, according to Dataquest.

IBM recently contracted with Steven Jobs, co-founder of Apple Computer, Inc. and current president of Next, Inc., to license an interface Jobs will develop for the RT, which will reportedly be called Nextstep.

Jobs showed his flair for interfaces with the Macintosh. Yet he has also mocked IBM in the past. At Apple, Jobs oversaw the famous Big Brother ad, which most viewed as an unsubtle reference to IBM.

"I'm shocked that IBM would buy anything from Steve Jobs," Alsop says. "It shows the lengths they are willing to go to make the RT a viable product." But Jobs also knows how to make a company seem exciting, to get it moving. Here, as in other areas, IBM could do worse than ally itself with a maverick. •

User View

Eric Sokol
Manager of Systems Development and Support Northwest Natural Gas Co.

Finding no single vendor to meet its project development requirements, Northwest Natural Gas Co. launched its own initial efforts at developing a computer-aided software engineering, or CASE, environment in 1986. Since then, the company has used CASE to develop high-quality systems with significantly reduced maintenance costs. These projects require both custom and packaged software.

At Northwest, the CASE concept includes the management approaches, development methodologies and automated tools to support all phases of a systems project. The company first used CASE on a critical project, successfully drawing the attention of top management. The success of the project led management to support expanded use of CASE.

CASE tools and techniques are used consistently within the company. Northwest made the transition to CASE using an informal plan that identifies the availability of tools and techniques and shows the sequence of projects.

The systems development methodology proved essential to the use of CASE, particularly during the early project stages. Graphic techniques enabled Northwest to dramatically improve communication with users during analysis and design, which greatly added to the quality of the system.

Also, carefully integrating process and data modeling kept each from dominating, as usually happens with traditional development methods.

Northwest expanded its use of automated tools as it developed the CASE environment. The company began with Applied Data Research, Inc.'s fourth-generation language, data dictionary and database management system on an IBM mainframe. Applications Builders, Inc.'s Focus was purchased to support development on a Digital Equipment Corp. VAX, and Index Technology Corp.'s Excelerator was acquired for analysis and design on IBM PCs. The PCs are also equipped with standardized word processing, project management and spreadsheet software. PCs are now standard office equipment for systems development and support staff.

Although a wide selection of automated tools is now available for building a CASE environment, most vendors focus their attention on either the front end or the back end of the development process, so a large automation gap separates the two. Even with this problem resolved, any one vendor (including IBM) will find it extremely difficult to provide a completely integrated set of CASE products that addresses the entire development process.

IBM has yet to announce a CASE product. The company's literature discusses the Application Development and Application Enabling environments, which are but two of its entries into CASE. Users can only speculate that IBM will eventually provide an open architecture to support a multivendor CASE environment.

Even though IBM is hesitant to commit to a stated direction, recent articles in IBM's Santa Teresa, Calif., laboratory's *Reflections* journal certainly point toward the open architecture. IBM representatives talk about the concept of a data repository, and hopefully a product will be forthcoming. A central repository, whether provided by IBM or another vendor, will become the cornerstone for a fully integrated CASE environment.

The issues confronting Northwest are common to all IBM customers attempting to develop new application systems. IBM would certainly be helping all of us by committing to a direction for CASE — preferably one based on an open architecture. Those who are developing CASE environments could include it in their planning processes, and those who aren't might become more receptive to the CASE approach.

Underdog on the Plant Floor

Unaccustomed to being No. 2 in any field, IBM is using its enormous PC base to narrow DEC's lead on the plant floor

BY ANTHONY J. FRISCIA

IBM's manufacturing prowess produces some of the most sophisticated automated plants in the computer industry. Yet the company is clearly No. 2 in selling information systems to manufacturers.

More than half of 150 Fortune 500 companies surveyed by Advanced Manufacturing Research Co. are dedicated Digital Equipment Corp. users in the plant computing environment. Less than 10% identify themselves as IBM shops. Virtually all respondents, however, reported installations of IBM Personal Computers or clones on the plant floor.

Unaccustomed to second place, IBM is attempting to leverage this PC base to gain market share from DEC. As s result, MIS managers in manufacturing may benefit from the competition by way of new products and services.

In 1985, IBM first rolled out its new plant floor offensive, which was built around new products and partnerships. These announcements are the foundation of the current plant floor strategy. The major gains since 1985 stem from IBM's PC presence and the depth of its marketing and partnership efforts.

On the marketing front, IBM quietly emphasized computer-integrated manufacturing (CIM) and plant floor automation through its direct sales force, customer prospects and third-party distribution channels. The company set up s CIM National Support Center in Boca Raton, Fla., and installed 14 hands-on regional product demonstration centers and 44 mini-briefing centers.

To arm its sales force with products, IBM is aggressively recruiting software developers. These efforts include encouraging developers to port existing software onto IBM platforms; adding its initials and approval to PC software (for example, Intellution, Inc.'s Fix and Centec Corp.'s CAMM packages are offered under IBM's vendor logo program); licensing applications from third parties (for example, Cincinnati Milacron's Shop Application Edition for PCs and Qronos' Operations Manager for the 9370); and developing s catalog of software available on its products.

Meanwhile, plant floor products are being developed at four major development sites: process control software in Toronto; computer-aided design and manufacturing (CAD/CAM) and document management software in Kingston, N.Y.; production planning in Atlanta; and plant floor products in Boca Raton. Additional support is provided through Raleigh, N.C. (all communications products), and New York (all architecture products).

Friscia is president of Advanced Manufacturing Research, a Salem, Mass.-based research and consulting firm.

IBM's plant floor strategy

To address plant computing requirements, IBM is selling futures. Among the most eagerly awaited introductions — and the most confusing — is the Systems Application Architecture (SAA) for manufacturing.

Through SAA for manufacturing, IBM promises the user a scalable product line that approaches single-image, virtual-system capability — a common environment for applications compatibility between IBM's three primary product lines: 370 (9370), System/36 and 38 (Application System/400) and PC (Personal System/2).

SAA for manufacturing is expected to provide the framework for IBM's four plant floor application areas:

- Area/Cell control: The strategy is to support the 9370 and PC families using s common application programming interface (API) under SAA.
- Plant floor communications: A strategy to support Manufacturing Automation Protocol (MAP), PC network (Nethios) and Token-Ring.
- Data collection: For these applications, IBM offers the 7494-ELF and the 7456 Multimedia Plant Floor terminal. Both interface to the PC AT, the Series/1, the System/36 and 38 and 370 hosts as well as the industrial computer family. These devices collect data from bar code, magnetic strip and keyboard input.
- Shop floor graphics: Two key product lines make up the IBM shop floor graphics strategy: Shop Assist and the Data Communications Service (DCS). Shop Assist, part of the Graphical Display and Query Facility family of products, is used to display assembly or manufacturing instructions — merged text and CAD graphics — on IBM PCs. DCS, available on both VM and MVS systems, facilitates the integration of different applications used in a CAD/CAM environment.

IBM is positioning the 9370, with VM as the primary operating system, as s small plant host or area computer. Support for individual cells and plant devices is through the PC family. The goal is to encourage users and OEMs to develop software

on the 9370 and PC platforms using APIs.

Note that the AS/400 supports manufacturing applications but is not represented as the core product for Fortune 500 accounts.

This positioning is not an issue, however. Under SAA, the application is unbundled from the operating system and platform. The engine is transparent to the end user.

Conceptually, IBM proposes an architecture that combats DEC's VAX/VMS portability advantage.

Clearly, the key to IBM's growth in the CIM market is to counter DEC's dominance with the installed base of PCs. More than 500,000 general-purpose and hardened, or protected, PCs are already on the plant floor.

However, the PC family is still incomplete. There is no mid-range product that rivals the Microvax.

To fill this void, we expect IBM to announce a next-generation 7552 Gearbox (hardened PC) that compares to the PS/2 Model 70.

Communications

IBM's direction for plant communications is three-pronged:

- Device connection strategy: A Real-Time Interface Co-processor, referred to as Artic, providing communications to and from cell devices on the plant floor. To rival DEC's Baseway in device access and control applications, IBM introduced Device Data Management Support (DDMS).

DDMS allows for the capture and management of data from plant floor devices; it provides communication to Programmable Logic Controllers (PLC), including download, upload, comparison and initiation of user-written programs.

- Local-area network strategy: A broadband LAN on the shop floor running PC Network and/or MAP. For customers who do not require broadband or multivendor networking and who are not sensitive to electrical noise or wiring-length specifications — for example, many electronics industry plants — IBM intends to sell the Token-Ring network. We estimate that most PC connections on the plant floor will use PC Network.

PC Network has three selling features in the plant floor communications market. First, it is a low-cost connection product, priced at $300 per connection in volume. Second, it has IBM Netbios support and is based on broadband. This PC Network/Broadband strategy is consistent with IBM's support of MAP for multivendor networking. Once broadband is installed, the plant is wired for MAP connections as well (MAP and the PC Network coexist on the same broadband cable, running on different channels).

- Wide-area networking strategy: Systems Network Architecture (SNA) with an ISO Open Systems Interconnect (OSI) migration strategy. At Enterprise '88, IBM displayed the dual-protocol stack co-resident on an IBM host. The goal is to define a common programming interface that sits above OSI and SNA. Thus, applications can run on both protocol stacks transparently.

PCs on the plant floor

IBM's strength in manufacturing — the proliferation of PCs on the plant floor — occurred much to the surprise of traditional process and discrete controls vendors.

Surveys indicate that these PCs are used for more than office and engineering applications and that there are many more PCs on the shop floor than most market figures indicate.

IBM's figures, for example, do not take into account the large number of general-purpose plant floor PCs purchased at retail stores like Computerland. Moreover, it is virtually impossible to account for the proliferation of mail-order clones.

IBM IS MAKING SIGNIFICANT inroads into the plant floor with the PC product line. This low end represents IBM's best opportunity to challenge DEC as the prime computer vendor within the plant.

Generally, PCs are used on the plant floor for the following applications:

- They act as hosts for small networks of real-time controllers (PLCs, Computer Numerical Controllers and microcomputers).
- They have been incorporated into data collection systems, such as bar code wands, bar code scanners, tool identification systems and operator displays.
- They are increasingly being used as plant floor data concentrators, providing interconnectivity for the disparate devices found in the manufacturing environment.

Despite all the industry talk of the need for ruggedized equipment on the plant floor, hardened PCs represent a minuscule portion of IBM's installed base. We estimate that the ratio of general-purpose to hardened PCs on the plant floor is approximately 30-to-1. Plant tours and user interviews reveal that most PCs are in air-conditioned control rooms. There is thus no reason to absorb the additional costs of ruggedization.

There are applications, however, that require the features of a ruggedized PC product line, so hardened PCs are a part of IBM's strategy.

While PCs are inexpensive and user-friendly, they are also slow, possess a primitive non-real-time operating system and are environmentally fragile.

In many "clean" plants, general-purpose PCs are successfully used as workstations running control applications. In many other plants, however, several problems exist.

The original PC operating system, PC-DOS, for example, though greatly improved over the last seven years, is still a single-user, single-tasking monitor suited to neither real-time nor control applications.

Moreover, the PC family, up to and including 8-MHz IBM PC ATs, is limited in compute power, unlike the high end of the PS/2 family and some clones. There are additional problems regarding environmental contamination, the quality of plant floor power, control applications requirements, maintenance issues and security. IBM's solution to these problems is the 7552 Electronic Gearbox.

IBM's Gearbox

To address the unique problems of applying the PC architecture in the more challenging applications and environments of the plant floor, IBM, in the fall of 1986, introduced the 7552 Gearbox.

We estimate that IBM has installed approximately 15,000 ruggedized PCs. Gearboxes represent a small portion of this base. Nonetheless, the product was sold out in 1987.

Since its introduction, numerous OEMs began marketing the product. Others, like Action Instruments, Inc. in San Diego, are building complementary products.

Gearbox addresses end users' real-time and performance issues, environmental requirements and maintenance concerns — extending, in a real-time controls sense, the capabilities of ruggedized PCs introduced in 1985.

To address plant floor CPU real-time and performance issues, Gearbox supports a series of plug-in Artic coprocessors that provide incrementally installable real-time compute power.

In addition, to meet the multitasking requirements of the plant floor, IBM began shipping OS/2 versions of Gearbox in February.

The combination of Gearbox, enhanced with Artic and extended versions of PC-DOS and OS/2, addresses the real-time performance needs of a large percentage of plant floor applications.

The announcement of a 386 Gearbox, presumably in the 25-MHz range, will extend these capabilities. This strategy also preserves software compatibility with normal general-purpose DOS or OS/2 applications.

IBM is making significant inroads into the plant floor with the PC product line. This low end represents IBM's best opportunity to challenge DEC as the prime computer vendor within the plant.

To achieve its goals, IBM is betting its future on SAA as well as the PC family. However, after discussions with end users and OEMs, we see several weaknesses in IBM's current and promised position.

While Gearbox represents state-of-the-art plant floor packaging, users complain that it is too slow and, at $15,000 to $20,000, too expensive.

This problem may soon be eliminated because Gearbox is currently a single product, but it does represent the beginning of a family of products.

A new family

We expect IBM to announce a next-generation Gearbox addressing these concerns. The product will be in the performance range of the PS/2 Model 70 — a 25-MHz, Intel Corp. 80386-based machine — and will include Micro Channel enhancements that allow it to handle a greater number of interrupts and operate at greater clock speeds. As a higher performance system (rated at 5.6 million instructions per second), the new Gearbox will certainly be competitive with higher priced systems.

OS/2 is often criticized for lacking real-time features, which are defined as having millisecond response times to interrupts. We believe IBM has no intention of positioning OS/2 in the real-time market. No general-purpose, transaction-, file system- and virtual memory-oriented operating system, including DEC's VMS and Unix, is a real-time operating system.

To provide real-time performance, a vendor can either run the operating system on top of a separate real-time operating system or use a dedicated front-end processor with a real-time operating system. IBM offers the latter option, providing Artic with real-time control microcode.

To enhance this performance, a recent software announcement allows the user to link this real-time microcode into OS/2.

Perhaps the strongest argument against IBM's position is the validity of DEC's advertisement: Though IBM offers the promise of SAA, Digital has it now.

As the market leader, DEC has a compelling story to offer the user today. To maintain its existing PDP base of customers, DEC offers the scalable VAX/VMS architecture. Many users, and most plant floor OEMs, have already ported existing applications to VMS.

In the short term, therefore, it will be difficult for IBM to cut into DEC's strong position in the plant architecture market.

We believe, however, that as SAA unfolds in 1989 and beyond, the battle will become more competitive. IBM's PC base cannot be discounted, nor can its strength in the boardroom.

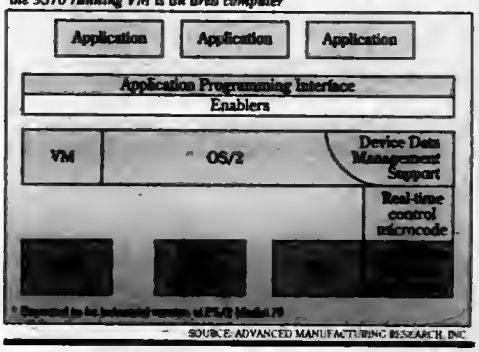
In summary, IBM's challenge is to implement its new strategy credibly. To do so, the company must achieve the following goals:

- **Deliver SAA.** Offer the user a credible alternative to the VAX/VMS architecture.
- **Implement SAA.** Ensure that each product within the line is competitive within its class, rivaling the VAX, Microvax and Industrial VAX families.
- **Popularize SAA.** Attract OEM support to port existing applications — predominantly PDP-11 applications under RSX — onto IBM platforms.

It is more natural for these DEC OEMs to port from RSX to VMS, so IBM has an uphill battle. The company must also attract new applications for its plant floor platforms. •

IBM's proposed manufacturing architecture

PCs running OS/2 form the core of IBM's plant floor strategy; the 9370 running VM is an area computer



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Comment

Where Does An Operating System End?

AS/400's bundled DBMS may be a signpost to IBM's future software strategy

BY SHAKU ATRE

IBM operating systems are traditionally built for system-friendly users, not user-friendly systems. The systems' limits in ease of use result from limits in function.

The Application System/400 signals a new strategy that may change this approach.

The key example of this change is the integrated database bundled with the AS/400 operating system, OS/400. Bundling in a database management system makes the AS/400 more attractive to smaller companies, which can use it as their computing backbone.

The delivery of OS/400 demonstrates IBM's desire to keep complete control of the database management market. The move forces independent software vendors to participate in the applications arena but not compete in DBMSs. IBM wants them to be "business partners" — IBM's new marketing term for designated vendors — and not business rivals.

Importing and exporting DBMSs other than IBM's to the AS/400 will be very cumbersome. It will be interesting to see how companies like Oracle Corp. and DBMS companies for the System/36 and 38 attempt to enter this market.

Besides extending the definition of operating systems to include DBMSs, the OS/400 strategy conforms to IBM's announced intentions for Systems Application Architecture (SAA). The AS/400 is IBM's first attempt to deliver on the promise of SAA.

The announced goal of SAA is to provide end users with transparent access to any data, application or function in a network, regardless of where it is or what engine is used to run the application.

SAA is an architecture — *not* a product. It is supposed to support the three hardware platforms: the 370; the System/36, 38 and AS/400; and the Personal System/2. As for operating systems, SAA should support MVS, VM, SSX (or OS/400) and OS/2 Extended Edition.

SAA is to support the following interfaces:

- Common Communications Support, to provide interconnection among applications.
- Common Programming Interface, to provide tools, languages and services for developing applications.
- Common User Access, to provide common screen design and interaction with users.
- Common Applications, to provide productivity in running an organization's applications.

An important component in carrying out the goals of SAA is the designated SQL. The AS/400's SQL possesses attributes similar to those of other IBM systems. The following are some of SQL's strengths:

- It supports a simple data structure of the relational data model of a table.
- It is a higher level language than Cobol, so it provides more data independence and keeps a better distinction between the physical view and the logical view.
- It has a shorter learning period than Cobol.

Of course, SQL also has its built-in weaknesses:

- It lacks built-in functions.
- It is a set-oriented language that has disparity with record-oriented languages such as Cobol and Fortran.
- Writing the same query differently can cause different performance results.
- It needs more nouns, objects, verbs and many more items to be considered a *full-fledged* language.
- It is deceptively simple. As a result, if used without proper training it could give the user misleading results.

Quite continental

Despite its flaws, SQL and the bundled OS/400 database will facilitate the concept of community computing using local-area networks. The AS/400 could play the role of a file server with an SQL engine. This style of work is quite popular in Europe, where organizations are much smaller than U.S. conglomerates.

Smaller organizations usually cannot afford to hire an army of systems programmers, so ease of use is their top priority in purchasing a computer system.

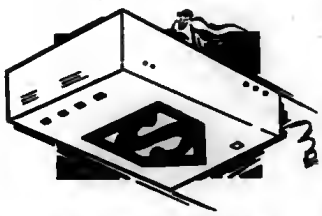
Smaller companies also look more for applications software than for more iron. IBM and its 150 business partners announced more than 2,600 applications for the AS/400 — all of them supposedly available on the day of the hardware shipment.

IBM might be selling as many as 70% of its AS/400 machines in Europe and the rest in the U.S. A leasing plan introduced with the AS/400 announcement will attract American companies as well. The leasing plan, of course, will help IBM's balance sheet somewhat over the long run.

While the system seems to be attractive to small companies, particularly in Europe, its architecture leaves one question unanswered: Where does an operating system start and where does it end? •

Atre is president of Rye, N.Y.-based Atre Computer Assistance.

IBM and . . .



SUPERCOMPUTERS

BY ROBERT TRIER

If you are waiting in the stands of the supercomputing arena for IBM to step out and do battle with Cray — machine to machine, logo to logo — sell your tickets; go home. That match won't take place. It isn't part of IBM's strategy, nor is it in IBM's culture, to go chasing market share in the upper reaches of the high-performance computing market.

The term supercomputer refers to a market niche. While the niche doesn't change — "the most powerful machines made" — the specifications for machines that qualify do. The qualification bar goes up every year.

General-purpose computing also refers to a market segment, and every year the users in that market demand more power, faster I/O, faster storage devices and the ability to handle more complex computing tasks — with one caveat. They want all that and ease of use, too. More specifically, they want good software development tools, good network management tools, good system utilities.

Looking to expand

So what is IBM up to with its stake in Supercomputer Systems, Inc., its collaboration with the Los Alamos National Laboratory and its many other high-end research efforts? No doubt about it, IBM is looking for ways to expand its user base. But the strategy is to do so under the canopy of general-purpose computing.

The reality is that a publicly held high-tech corporation must grow. IBM, not content with the growth prospects in its traditional markets, began casting about for the next hot growth market. That market appears to be the use of computer models and simulations in commercial research and engineering. For example, chemistry is no longer taught through laboratory experimentation; it's taught through computer simulations. The same can be said for engineering; experimentation is migrating from prototypes and physical models to mathematical models and the computer screen.

The use of statistical modeling as applied to finance is legion on Wall Street, long a bastion for Big Blue hardware. Last year, when the Research Consortium conducted a survey among high-performance computer users, we found few using the capabilities for financial and business simulations. This year, when surveying that community, we found a dramatic increase in the number of users doing statistical modeling in the business and financial arenas. As algorithms improve and more code becomes available, computational techniques will be applied to a broader and broader range of problems. This boom, of sorts, has not been lost on IBM.

A shift in techniques

It is IBM's belief that supercomputing techniques — most notably vector processing — are expanding and extending beyond the pure research environment into the commercial environment. As that transition occurs, there will be a need for better data handling, more interactive capability, broader support for multiple users and more comprehensive networking capabilities.

IBM's strategy is to meet that market need by supplying vector-processing capability supported by the full complement of facilities traditionally offered in a general-purpose environment. Currently being tested, and likely to be announced in the near future, are two examples of enhancements to the general-purpose environment that were inspired by the supercomputing environment: parallel Fortran and high-speed channels.

Fortran is the dominant language of numerically intensive computing. IBM has enhanced Fortran so that it can take advantage of the parallel computing inherent in a 3090 with vector capability. To accommodate the trend toward visualization — the use of graphics to pictorially display a mathematical result — and the need to move the large data sets used in mathematical simulations, IBM will implement a 100M-byte high-speed channel. Currently being tested, this enhancement will be integrated into IBM's high-end, mainstream product line.

In addition, IBM has a number of research projects that will let the company observe high-performance computing requirements and better determine how to accommodate these techniques. Among these projects are GF11, RP3, Sage and YSE. GF11 is a project to build a processor that will perform 11 billion arithmetic operations per second. RP3 is a project to simulate and examine potential problems likely to be encountered in the simultaneous use of multiple processors. Sage will allow IBM to gain experience in the use of a large number of parallel processors as applied to computer graphics. YSE is involved in the development and simulation of high-speed circuitry.

Equally important to IBM's addition of engineering and scientific capabilities to the mainstream product line are several joint projects. These projects should be viewed as experiments, as opportunities to observe and gain experience in the problems and requirements encountered in high-performance computing environments.

From IBM's point of view, the Supercomputer Center at Cornell University is a real-life laboratory, a test site for IBM and its vector facility. The center is a multiuser, multi-application environment — the kind that is likely to raise issues and problems that one might encounter in a commercial enterprise.

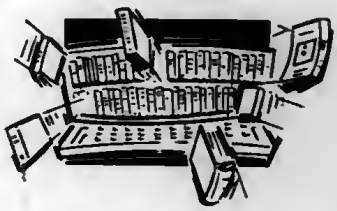
The collaborative arrangement with the Los Alamos National Laboratory provides another point of view — most notably into networking issues. Not only is the laboratory actively engaged in formulating and experimenting with the bleeding edge of computational capabilities, it must serve an array of users and user requirements. It does so by managing a mixed bag of machine types — one of everything worth experimenting with — and making this multivendor environment available via network to local and remote users. Through the laboratory, IBM will undoubtedly observe many communications problems and see how they are solved.

And what about Steve Chen's Supercomputer Systems, Inc.? SSI is an independent organization that may some day compete directly with Cray Research, Inc. But SSI's target customer is not IBM's. The real function SSI will provide for IBM is research. It will be a place where IBM can see what works and what doesn't, a place to watch firsthand what happens when this or that new technology is applied to a computing machine. It's the long-range lab.

IBM's goal, with all its projects and alliances, is to understand today's high-performance computing issues well enough so that somewhere down the road, the firm will be in a position to apply that technology to its customers painlessly.

Industry watchers seem to be asking when IBM is going to come up with a machine that can compete with Convex Computer Corp. or Cray. It is not. The 3090 will evolve into the next major product family. The vector facility will migrate from an added capability to a tightly integrated internal capability. IBM machines will get faster, channel speeds will go up, parallelism will be applied, and end users will still get a machine that is fully supported on a network, does database management, data handling and accumulation and provides storage control.

Trier is director of research at the Supercomputer Research Consortium, Inc. in Minneapolis.



EXPERT SYSTEMS

BY PAUL HARMON

While staying above the early turmoil experienced by the artificial intelligence vendors, IBM is quietly preparing for and encouraging the future acceptance of expert systems.

To understand how this strategy can be successful for IBM, MIS professionals must take a long-range point of view.

Like any new technology, AI and expert

ILLUSTRATIONS BY PAUL DOLAN

systems are promoted by eager advocates, backed by venture capitalists and chronicled by the press. At the same time, however, AI supporters are also encountering some problems.

In 1983, the early companies formed to market expert systems assumed that corporations would approach knowledge processing the same way the universities did in the late '70s and early '80s. They assumed that corporations would train programmers to use LISP — the AI language of choice — to acquire LISP-based expert-system building tools and to field resulting applications on LISP hardware.

They also assumed companies would begin by tackling large, complex problems using this new technology. Now, after five years of experience, we can see that their assumptions were invalid.

Lots of corporate research and development groups experimented with LISP and LISP hardware, but most MIS departments simply waited for the technology to mature. IBM waited too.

The LISP machine companies are now largely nonexistent. It turns out LISP can run just as efficiently on Sun Microsystems, Inc. workstations, Apple Computer, Inc. Macintoshes, 80386 personal computers and even IBM 370 machines as it can on dedicated hardware. And expert-system building tools can be written in conventional languages.

Moreover, knowledge processing techniques can just as easily be used to help solve small to mid-size problems as to solve large, complex problems.

Vendors repositioning

Most of the early expert systems companies are trying to reposition themselves for the realities of the commercial MIS market. The use of expert systems is growing quite rapidly, and the companies that took a conservative, long-term view of the market and focused on conventional languages and hardware are doing well.

IBM is a good example. The company believes that knowledge processing concepts and techniques will result in valuable products. Once companies understand how to use this technology effectively, they will be eager to use it, IBM thinks, even though it will require new investments in computer hardware since it tends to be memory intensive. First and foremost a hardware vendor, IBM fully expects that software incorporating expert systems technology will result in significant hardware sales.

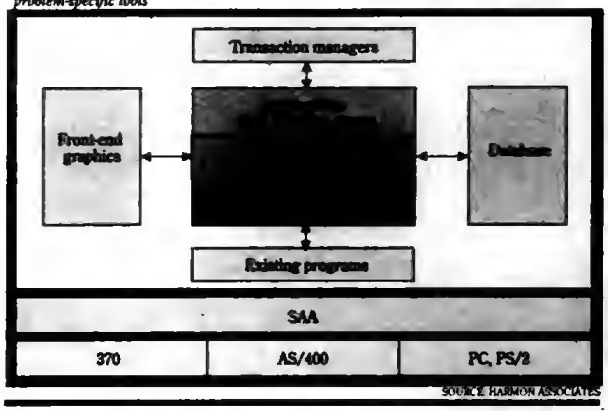
While IBM does not release any financial data to describe its venture into knowledge processing, Digital Equipment Corp. does. DEC maintains that AI-related sales in manufacturing, petrochemical and financial services are contributing significantly to its bottom line and that 90% of the company's total AI sales dollars come from hardware sales.

Like DEC, IBM is not dependent on software sales, nor is it involved in expert systems to make a profit for venture capitalists during the coming year. Thus, while the smaller companies have struggled through the market gyrations of the past five years, IBM is slowly and surely laying the groundwork for the expert systems market of the '90s.

DB2, one of IBM's current software mainstays, is based on relational database technology, which took 15 years to gain acceptance. Thus the company understands how quickly it can introduce new technologies into the conservative MIS environment. Hence IBM's strategy: to create products that allow IBM and selected innovators to try out various approaches. Even if IBM's products don't succeed, the company's endorsement of the technology will help to legitimize the market. Whoever succeeds, the bottom line will be a significant increase in the need for more hardware capacity.

IBM's expert system strategy

The Knowledge Processing Environment rests on an SAA foundation with an interface to databases and artificial intelligence languages; programmers will be able to focus on problem-specific tools



SOURCE: HARMON ASSOCIATES

IBM currently offers high-quality versions of LISP and Prolog running on 370 machines. Although LISP is not yet supported by Systems Application Architecture (SAA), it's rumored that it will be soon. IBM probably doesn't expect many companies to start using LISP in a big way, but they do expect that its availability will encourage companies to experiment with symbolic languages, and they know it will enable other LISP-based products to run on mainframes.

The company is actively selling Expert System Environment (ESE), an easy-to-use expert system building tool; Knowledgetool, a more difficult tool written in PL/I; and KEE, a very powerful and complex LISP-based tool. ESE allows nonprogrammers to develop mid-size expert systems. It is written in Pascal, but that hardly matters since the developer only needs to concentrate on developing rules to describe the knowledge a human uses to analyze and solve diagnosis problems.

Most of the expert systems developed during the past three years have been small to mid-size systems, developed by engineers and technical personnel who know how to solve problems but lack programming skills. A typical example is Deft, an expert system that was developed by IBM engineers at their 3380 disk assembly plant in San Jose, Calif.

When a 3380 disk drive unit is completed, it is put through a live reliability evaluation and monitored by a conventional computer system called DRES. Formerly, when problems were uncovered, technicians would read a DRES printout and then make the repair. Deft possesses the diagnostic knowledge of the senior engineers, who are expert at reading DRES reports and deciding how to repair a defective 3380 unit. The system was developed in seven to 12 person-months using ESE. IBM says it reduces parts waste by half and increases the productivity of test technicians. Deft is now used at all four IBM 3380 assembly plants and is saving IBM more than $9 million per year.

ESE runs in major 370 environments. Applications can be delivered on PCs.

IBM's Knowledgetool is an improved version of an older tool called OPS5. Compared to ESE's ease of use, Knowledgetool is more like a programming language. It is designed for applications programmers who can program in PL/I.

Knowledgetool is primarily used to develop small monitoring programs. The inference engine and the knowledge of the monitor are then embedded within existing conventional applications. These small expert systems watch the conventional application and swing into action when they notice an unusual pattern. They either alert the user or analyze the pattern and recommend corrective action. Knowledgetool can be embedded in all major 370 environments.

IBM's third tool, IBM KEE, provides rules, object-oriented programming, dynamic data typing and dynamic memory allocation, as well as other advanced AI techniques. IBM KEE is designed for AI specialists in corporate R&D groups who are interested in developing and fielding large, strategic new applications.

KEE resides on a mainframe but can only be accessed via a PC terminal running DOS 3. The tool provides a graphic development environment that includes powerful editing and debugging utilities and a delivery environment that can handle complex graphic simulations.

An analyst might argue that there are better tools in each category than the three offered by IBM, but the fact is that IBM is active in all three areas and funds a massive development effort to improve all three tools in the coming 18 months.

The next phase

The next phase in the development of the expert systems market will include the development and sale of a number of more specialised tools that will help MIS programmers develop applications to solve specific classes of problems.

While current tools are primarily designed to help developers create conventional applications, these new tools will be designed to develop more specialised and difficult applications, such as large equipment diagnosis and factory scheduling. Indeed, they will probably be classified as intelligent computer-aided software engineering (CASE) tools. Whether applications are developed in a language, in a generic tool or in a problem-specific tool, companies possess lots of applications that they are going to want to integrate into the 370 environment.

With over 100 internal expert systems in use, IBM is using AI in many of its large systems integration contracts and is even incorporating expert diagnosis utilities in its hardware and software products. When companies go to field intelligent CASE tools or the applications written in such tools, they will find that IBM is anticipating their need by creating a Knowledge Processing Environment (KPE).

The KPE is announced, but only limited information is available. KPE will sit on top of SAA. It will consist of a core of basic AI inference and control techniques. It will also include interfaces to IBM databases and other languages.

Thus programmers and vendors will be able to focus on developing problem-specific tools and applications, interfacing their systems with KPE and letting KPE connect them to all of the other aspects of the 370 world. The development of KPE clearly suggests that IBM is planning for the AI needs of the '90s.

In other words, IBM is covering all the bets for the first phases of expert system development. The company currently offers LISP, Prolog and three tools and is developing lots of internal applications to eventually teach users how to use these tools. The company is even beginning to package some expert systems with its current product line. It is working hard on improving its second-round products, while positioning KEE and creating KPE to prepare for the next round.

If you talk to people at some of the leading expert systems companies, they say IBM is behind. These companies think they have won the early innings, and in a sense, they have. But in fact they are probably only warming up on the field; the ball game hasn't really begun yet.

In spite of early successes, no expert systems vendors are making large profits yet, simply because the market isn't large enough. This is because most MIS departments still don't understand the nature and uses of expert systems concepts and techniques. And that's where IBM comes in: IBM is systematically educating the market while watching, learning and getting ready for the real expert systems market, which is just beginning to unfold.

Harmon, based in San Francisco, is a co-author of *Expert Systems: Artificial Intelligence in Business* and *Expert Systems: Tools & Applications* and editor of the "Expert Systems Strategies" newsletter.

IMAGE PROCESSING

BY SAMUEL JAY KALOW

IBM announced the Copier I in 1970 and introduced laser printing with the 3800 Printing Subsystem in 1975. However, it was not until 1983 that IBM delivered the first IBM product that met today's definition of imaging systems.

Called the Scanmaster I, the system could capture, transmit, store and print documents in noncoded form (images). In

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addition to permitting point-to-point communications, from one Scanmaster to another, the IBM strategy was to complement electronic mail.

When IBM announced the Image Plus System for MVS/ESA, Applications System/400 and System/36 users in July of this year, the company set a new strategic direction. Rather than just provide enabling products, IBM is attempting to provide an application solution for users needing to input, store, retrieve and distribute image documents. A recent statement also indicates that IBM's Personal System/2 will probably be the preferred workstation of an Image Plus system.

IBM's latest optical storage subsystem products for attachment to either midrange or mainframe computers provide up to 128G bytes of write-once read-many (WORM) storage. This enormous capacity will inevitably drive the opportunity for electronic filing and retrieval of virtually all documents within an organization.

The filing emphasis is further enhanced with the support of IMS, CICS and DB2 database/data communications products. True, Image Plus can also support electronic mail, but a user would hardly invest in the total system just for distribution applications.

The road to IBM's current image strategy has been a slow one, with pitfalls and sidetracks along the way. Starting in 1980, Distributed Office Support System (Disoss) was the key program in IBM's office systems strategy. The Scanmaster I was designed to support Disoss and Document Interchange Architecture (DIA).

With this support, a user of Disoss could store and forward coded and noncoded documents throughout a Systems Network Architecture (SNA) network. In addition, Disoss library services could enable an organization to file both coded and noncoded documents electronically.

The Scanmaster I has since been discontinued from active marketing.

IBM missed growth in fax market

IBM missed the growth in the facsimile market because Scanmaster did not support the Group III specifications. It used a nonstandard 180 dots per inch. On the other hand, the Scanmaster brought innovative concepts to the imaging industry that have since become widely used.

The Image View Facility program provided the ability to view a stored image document on the screen of a video display terminal. In addition, the Scanmaster I could be used as a copier. Another feature was a character generator that let Scanmaster I act as a printer for keyboarded (or coded) documents.

All this capability had only limited acceptance in the marketplace for two main reasons: the lack of compatibility with other products and the limited acceptance of Disoss.

The next step in IBM's imaging strategy was to support applications that had only occasional need for images, such as desktop publishing. In June 1986, a series of products and programs were announced to support image processing. They included the 3117 and 3118 scanners, the 3193 VDT, and programs for both personal computers and mainframes. Image Support Facility 2 provided an application program interface for all models of personal computers running PC-DOS.

IBM continued its imaging strategy with the announcement of the PS/2 in April 1987. With the screen design called Video Graphics Array (VGA), larger hard disks (because images take up more memory than coded information) and high processing speeds, the PS/2 is better suited for image processing.

Along with the PS/2 came the 3363 Optical Disk Drive. The 3363, as a WORM storage system, participates in the image processing just as a magnetic disk drive would do. The 5¼-in. disk holds 200M bytes of information, and as many as eight drives can be connected to one PS/2, for a total of 1.6G bytes of storage.

Mid-range systems were poised for image applications with the announcement of AS/400 in June. The integrated office software program, which runs on all models of AS/400, uses scanners and PCs with image software.

The AS/400 computer will act as a shared file server for image documents. Software is planned to overcome the existing incompatibility of pixel rates. For example, IBM's highest-quality printer is the 4250. It uses an electro-erosion process on special paper to provide 600 pixels.

Another aspect of image processing is converting written characters to digital code. IBM recently announced the 3119 page scanner, which can recognize the letters and numbers that can be converted to coded information and that part of the page that can only be digitized as noncoded information.

It will take several years for the full implications of Image Plus to unfold. The first two installed systems are demonstrating that this new strategy is not just a "paper" announcement. While Image Plus does not use Disoss as its library and distribution program, MVS/ESA and the DB/DC products provide these functions.

Nevertheless, Image Plus supports DIA and SNA Distribution Services. In this way, documents can be interchanged with Disoss users.

While Image Plus does not run in a VM environment, documents can be exchanged with Professional Office Systems, a popular office product that uses VM support.

System, not user, should decide

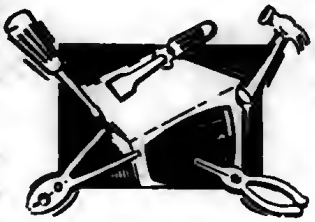
The ultimate objective is to use Systems Application Architecture so that whether one is filing on a microcomputer, minicomputer or mainframe, the steps are the same for either image or coded documents. The system, rather than the user, should decide the best place to file a document, optical or magnetic, and the right place to search for a document.

Other functions, such as security, backing up files, rules for records retention and disposal, will be supported by existing or planned IBM programs.

IBM's imaging strategy and products basically support a monochrome environment. With the growing acceptance of full-color displays, color copiers with laser technology and improved full-color ink-jet printing, there should be a corresponding demand for color image processing.

Color requires that four times as much information be processed, but, again, the higher speeds of logic and memory circuits make this enhancement possible. The VGA on the PS/2 and all the other elements of technology position IBM to take a leadership role in the future of image processing.

Kalow is president of IOTA Consulting, Inc. in Wyckoff, N.J.



CASE

BY VAUGHAN MERLYN

What might IBM have up its sleeve with regard to the computer-aided software engineering (CASE) market?

The answer can be found in a vision of an Application Development Environment (ADE) that was first publicly described by Miles Welter, IBM's manager of applications development planning, at the CASExpo conference held in Dallas in May.

ADE appears to be IBM's strategic response to the burgeoning CASE industry. It will comprise a group of products that form an architecture for application development automation, a sort of meta-CASE environment. The vision driving ADE is based on recommendations from IBM users groups and individual users worldwide. It embraces both an "old code" and a "new code" strategy, implying that it will provide for new development, maintenance and reengineering.

ADE is not yet available, nor has it been officially announced by IBM. However, it is important to understand ADE not just because it will represent IBM's strategic entry into the CASE business, but because it could ultimately reshape the CASE marketplace. For example, ADE interface specifications will be published by IBM, so that over the next few years some CASE tool vendors will produce products — or reengineer their existing products — that can be integrated into the ADE framework.

Available CASE products will then divide into those that are ADE-compliant and those that are not. Analogies can be drawn with SQL and its impact on the database management systems market. When IBM embraced SQL, the DBMS market quickly divided into those that were SQL-compatible and those that were not. The SQL-compatible products prospered more than those that were not. Just as SQL shaped the DBMS marketplace, ADE could shape a significant portion of the commercial CASE marketplace.

ADE should be thought of not as a CASE product, but rather as an integrating environment that will allow various CASE products to operate together as if they were integrated with one another. Such an integrating capability is becoming increasingly important to users of CASE approaches.

While integration and CASE are terms that should go together as naturally as apple pie and ice cream, those trying to establish integrated CASE environments are finding that achieving integration can be difficult. The various components that must work together to form a CASE solution first need to be integrated with each other, and then the total CASE solution must be integrated into its environment.

MIS organizations need to blend CASE into their particular application development and maintenance setting, including new and existing methodologies, standards, procedures, tools and applications.

IBM is relatively inactive in the CASE marketplace. It remarkets Index Technology's Excelerator and Microfocus' VS Cobol Workbench under a marketing agreement, but this channel is not particularly effective.

Workstation Aided Software Engineering (WASE), available since May, is a PC-based front end that uses IBM's Professional Work Manager. This product provides a customized environment for accessing CASE tools, including those available under the vendor logo arrangement, but it is not being aggressively marketed. The Cross System Product (CSP) application, available for a number of IBM platforms for several years, is not gaining widespread acceptance.

IBM's limited participation in the CASE market is not surprising. It conforms to a typical pattern, in which IBM maintains a rather passive presence in an emerging market until the market becomes established and customer directions become apparent. Then, and only then, does IBM make a real commitment to take its piece of the market.

The ADE architecture embraces the much-discussed but elusive "repository," or large system data dictionary, coupled to a project support framework. This framework is conceptually similar to the so-called Integrated Project Support Environments that are quite common in Europe and the defense community.

The framework is loosely based on a program product called Application Development Project Support (ADPS). ADPS, which was developed by IBM in Vienna, is marketed by IBM in Europe but is not currently available in the U.S.

But ADPS is apparently being used now within IBM in North America, and it is undergoing refinement and reorientation for its new role in ADE. This reorientation is expected to include provisions for cooperative processing, intelligent workstation support and Systems Application Architecture (SAA) compliance.

The ADE vision will lead to a series of product announcements, probably beginning late this year. The first of these announcements will be the repository for early support release in 1989. Other ADE components should follow over the next two to three years. These components will comprise IBM offerings, including a derivative of CSP with Cobol code generation via the recently licensed Transform technology, as well as independent vendor products. IBM states that tools developed in-house could be fitted into the ADE framework, although it is unclear how this might be achieved.

ADE's roots

In presenting ADE at CASExpo, IBM's Welter referred to an article called "Automating the Software Development Process," by G.F. Hofnagle and W.E. Beregi, published in the *IBM Systems Journal*, Vol. 24, No. 2, 1985. In the article, the authors discuss an architectural model for a software development environment that could integrate and manage the development process.

The model separates the issues of process control from methodology and provides a layered, integrated, flexible environment to support software development tools and development process automation. It is independent of any

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ASK IBM

What is IBM's vision of bank branch equipment of the future, and what type of telecommunications network will be required to interface with it (X.25, SNA, SDLC and so on)?

Bruce Battjer
Vice-President
Network Services
Meritor Finance Group
Philadelphia

Bank branch equipment for the future will include expansion of existing networks of dependent workstations plus the integration of intelligent workstations [personal computers]. The trend will be toward PCs, where discrete amounts of processing power can be tailored for the end user to more fully service a customer request and provide the tools for advanced marketing techniques to include, for example, expert systems as a decision tool.

IBM is well positioned for this marketplace with the extensive dependent and independent workstation product offerings provided by the 4600 Finance Communication Systems and its supporting software.

The Systems Application Architecture will be the vehicle that enables the implementation of application solutions to start on small intelligent workstations and grow to a wide range of processor alternatives that will support the integration of voice, data and image to further enhance office solutions.

Self-service devices that support cash and noncash transactions will continue to provide 24-hour banking services at convenient locations. Telecommunications networks that handle larger volumes of data will migrate locally to LAN connectivity. SNA will be the primary communications architecture, and IBM will offer solutions for varying connectivity requirements.

Does IBM intend to make C the hot programming language of 1989? Rumor has it that they intend to replace Cobol with C. Is this true?

James J. Burns
Vice-President
Corporate Data Services
Houghton Mifflin Co.
Burlington, Mass.

No, it is not true, but we do appreciate your referring to C as a hot programming language, because we are proud of the C/370 products we just announced. To frame your question in a broader context, C is part of what we call our SAA common programming interface.

Others are Cobol, Fortran, RPG, Application Generator and Procedures Language. IBM intends to fully support the SAA languages along with our other language products such as PL/1, Pascal, APL2 and ADA. We certainly do not intend to replace any of these languages with C, but we will be providing a strong C language facility for programmers who work with it and prefer it.

Is IBM serious about the industrial PC? Software released by IBM is rarely announced as operating on the IBM industrial PC. Does IBM plan an industrial PS/2?

G. E. Stubbins
Vice-President
Information Systems
Duke Power Co.
Charlotte, N.C.

IBM is very serious about industrial computing. As part of our overall commitment to Computer Integrated Manufacturing, IBM has developed industrial computers that are used as plant floor workstations and controllers using the Artic coprocessor.

We are making significant investments in CIM application software, and other software vendors also offer products that complement IBM's CIM solutions. We ensure that IBM software will run on our industrial computers, as well as on IBM PCs and PS/2s. The IBM 7552 Industrial Computer — called the Gearbox — includes advanced PS/2 features, such as the Micro Channel Architecture. The 7552 provides for a traditional AT bus interface for feature adapters from IBM and other vendors.

IBM's strategies are unfolding in regard to the common IBM-DEC management networking structure. Can we expect an announcement next quarter or next year on how IBM plans to manage the multivendor environment [the LANs/WANs common networking structure]?

Frank Daubeck
President
Communications Network Architects, Inc.
Washington, D.C.

We made significant network management announcements on Sept. 20. We have an arrangement with Interlink to provide the ability to manage Decnets from Netview. We provide SNA X.25 interconnect products, which will allow management of X.25 traffic flowing on an SNA backbone network under Netview; and in the longer term, we announced the [Open Systems Interconnect] communications subsystem, which will provide for management by Netview of both OSI and SNA communications.

How can IBM's Technical Service Management (TSM) help cut my maintenance costs?

Billy R. Davis
Manager of Operations
Hills Brothers Coffee, Inc.
San Francisco

IBM's Technical Services Management helps customers reduce maintenance costs by establishing IBM as the customer's coordinator for providers of hardware service. With IBM as the coordinator of customer service — on its own equipment and that of other manufacturers — the customer saves time and resources by not having to manage multiple vendors' maintenance activities.

Does IBM have any intent of marketing a tape library storage facility to interact with your 3480 cartridge tape drives?

Art Hensler
Operations Manager
Data Center
The Singer Co.
Wayne, N.J.

IBM has studied our customers' requirements for tape automation. We are looking at various options to reduce operator involvement with tape processing. For example, the company recently announced its intention to improve the data recording capability of the IBM 3480. IBM's direction is to continue to offer these and other options to meet our customer's requirements.

What is the future of laser printers — specifically, continuous feed and cut-sheet feed? I understand you have two products with IBM labels that are not manufactured by IBM. Does IBM plan to manufacture its own? What are your plans for pricing?

Bob Arends
National Operations Manager
Toyota Motor Sales

IBM is committed to responding to our customers' printing needs with high-quality products that provide a wide range of applications and maximum flexibility. IBM now offers a range of nonimpact printers that run from 12 to 215 page/min.

Nonimpact printers use laser, as well as other, technologies. To do this cost-effectively, IBM will continue to develop products in addition to purchasing equipment from other sources that is manufactured, modified and tested to IBM specifications. •

Continued from page 25

particular methodologies, tools or languages. The authors introduce a repository that stores the formal process descriptions and sequencing rules for life-cycle control, as well as the description of an object model, which provides a common logical view of the objects of development. Such a model would enable developers to maintain and share formal descriptions of the products under development, as well as formal descriptions of the activities required to manage the development and maintenance process. Objects of development are defined as separately identifiable collections of data that together make up the products to be developed using the software engineering support facility. These objects include requirements and design specifications, test cases and plans, program code and data definitions.

ADE's heart and hub

IBM describes the repository as the "heart and hub" of ADE. It includes a relational database implemented through DB2 and a repository manager, which is a set of application programs that control access to the repository database. The repository uses a database approach that conforms to the "three-schema architecture," as defined in 1977 by the American National Standards Institute.

This architecture provides for full data item and data structure independence from the use of the data. It does so by defining an "internal schema," a set of stored definitions of the physical content of the database; a "conceptual schema," a set of stored definitions of the logical content of the database; and an "external schema," which supports derived views independent of the conceptual schema.

IBM describes ADE by the analogy of a hi-fi rack that enables individual hi-fi components to be housed and interconnected to form an integrated whole. If you decide, for example, to replace a single-play compact disk with a multiplay unit, you can do so while preserving your investment in the rack and in the other components (or, with ADE, the investment in other tools).

ADE represents a cooperative processing approach in which user access is primarily through intelligent workstations with OS/2 Extended Edition. This workstation view will provide what is described as seamless access to the tools, whether host- or workstation-based. ADE allows application development to be treated as a distributed, cooperative application, with functionality distributed as appropriate, while maintaining central control and administration of the application development database and process.

Most of the tool functionality for the earlier life-cycle phases of planning, analysis and design will tend to be based on the workstation. As the life cycle progresses through implementation, the tool functionality will tend to shift to the host. The repository will reside on the host but will allow extracts to be checked out to the workstation for an interactive session. In such cases, the appropriate locking will take place at the host, in order to preserve repository integrity and to coordinate and synchronize work group activities.

The tools provided for ADE will be a mix of IBM products and independent vendor products. Furthermore, users or independent vendors can produce or adapt their own tools to be ADE compliant. It is unclear at this stage precisely what achieving compliance might involve.

ADE compliance will be partially solved, however, as a by-product of SAA compliance. IBM states that the Common User Access (CUA) standard of SAA will be extended in order to define tool interface standards and that it will publish the underlying entity models for the repository.

A sense of order

ADE appears to represent a reasonable, flexible and robust approach to software development automation for IBM customers. It promises to be a relatively open architecture. In addition, as long as independent software vendors produce ADE-compliant products, ADE should bring some sense of order to the chaos that now characterizes much of the CASE industry.

Much will depend, however, on the quality of the tools that are available under ADE and on human factors, including performance, user friendliness and adaptability. ADE will undoubtedly further reinforce DB2 as IBM's strategic database and will probably eventually tie in other strategic IBM products, including Enterprise Systems Architecture (ESA) and Expert Systems Environment (ESE).

However, ADE will most likely recognize only the IBM hardware universe. While ADE could become a standard framework for CASE tools within the corporate IBM customer's environment, it may not adequately address the development requirements of mixed or heterogeneous environments, where Unix-based CASE products and other CASE architectures will become increasingly attractive.

ADE will not be a deliverable reality for at least two or three years, probably longer, and many MIS organizations will not be able to wait. Many good CASE components and several integrated CASE environments are available from the independent vendor community, and these can be implemented today.

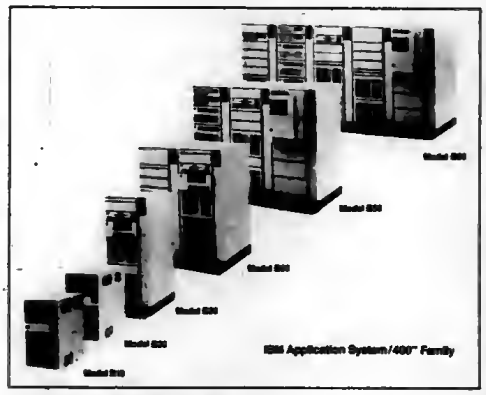
Merlyn is founder of Case Research Corp. in Bellevue, Wash.

Products

The Last 12 Months

BY SUSAN GRECO

IBM has announced more than 100 products since the publication of the last Computerworld Extra *on the company. The following is a list of selected major products. IBM supplied product specifications, except for MIPS estimates.*



NOVEMBER 1987

Product series: Integrated Banking Applications (IBA)
Product name: Integrated Loans Processing System; Integrated Deposits System; Relationships and Profitability System
Specifications: Available as individual applications or as single, integrated product.
Introduced: Nov. 2, 1987
Ship date: Nov. 13, 1987
Initial outlook: Derived from landmark 1986 agreement between IBM and Hogan Systems, Inc. that gave IBM exclusive marketing rights in U.S. to Hogan's banking software.
Current status: IBM sales force has failed to really move the system, analysts say. Some fear the agreement — and Hogan — may be in trouble. Both IBM and Hogan admit the relationship got off to a painfully slow start because both parties underestimated the sales effort required. However, Hogan and IBM say sales are picking up.

JANUARY 1988

Product name: 3745 Communications Controller
Price: $125,000 (Model 210); $187,000 (Model 410)
Specifications: Channel-attaches to a maximum of 16 separate 370 computers, supports up to eight IBM Token-Ring Networks and CCITT X.25 communications standard interfaces. Offers two independent central-control units employing air-cooled thermal conduction module technology, for balanced traffic and controller backup, and a 16K-byte cache storage, for faster access.
Introduced: Jan. 26, 1988
Ship date: September 1988
Initial outlook: Considerable performance gains over earlier 3725 high-end model, with claimed throughput of 1M bit/sec. A strategic product in peer-to-peer connections between IBM and other devices.
Current status: The 3745 is not only faster than the 3725, it is is more reliable, possesses a better architecture and, for some large systems, is cheaper, says Thomas Nolle, president of technical assessment firm CIMI Corp. Integrated Services Digital Network is easy to support on the 3745, and beta users report the unit is trouble-free, he adds. If you already have the 3725, it might be hard to justify the upgrade right off. "But," Nolle says, "if you have T1, you don't have a choice."

FEBRUARY 1988

Product series: 3090 Enhanced Models
Model name: 3090 Models 500E, 280E
Price (average configuration): $4.9 million (Model 280E); $9.65 million (Model 500E)
Specifications: 3090 Model 280E is a two-way multiprocessor configuration supporting up to 128M bytes of central storage, 512M bytes of expanded storage and 64 channels. 3090 500E is a five-way configuration supporting up to 256M bytes of central storage, 2G bytes of expanded storage and 128 channels.
Introduced: Feb. 15, 1988
Ship date: Model 280E: second quarter of '88; Model 500E: third quarter of '88

Product name: 3090 Processor Resource/Systems Manager (PR/SM)
Price (By 3090 Model E):
$60,000 (120E, 150E, 180E)
$80,000 (200E)
$100,000 (300E)
$120,000 (280E)
$180,000 (400E)
$180,000 (500E)
$200,000 (600E)
Specifications: Enables the event-driven, logical partitioning function of the processor complex. Enables 370, ESA/370 and logically partitioned mode. Supports a maximum of four logical partitions. Requires a 3090 E model processor unit and consists of a separate feature that is required for each central processor in the processor complex.
Introduced: Feb. 15, 1988
Ship date: August 1988
Initial outlook: IBM's attempt to spur demand for the 3090 through the year.
Current status: See "Initial outlook" for Enterprise System/3090 models announced in July. Along with 9370, the 3090 highlights IBM's new commitment to field upgradability — even major upgrades that may take 20 hours to do, says Bob Djurdjevic, president of Annex Research.

Product series: Enterprise Systems Architecture (ESA)/370
Product name: MVS/ESA
Price: MVS/SP Version 3 from $4,080-$4,800 (for basic JES2 license); $4,590-$5,400 (for basic JES3 license); $3,060-$3,600 (for multiple JES2 licenses); $3,440-$4,050 (for multiple JES3 licenses)
Specifications: Composed of MVS/SP Version 3 and MVS/DFP Version 3. Primary delivery vehicle for future MVS and DFP functional enhancements. Runs current applications with little or no modification, gives users of 3090E and 4381E access to about 16 trillion characters of virtual storage.
Introduced: Feb. 15, 1988
Ship date: July 26, 1988
Initial outlook: Reinforces IBM's efforts to redirect the mainframe as a corporate database machine and network manager, rather than an applications processor.
Current status: "The most important extension [to MVS] since XA in 1980," says Jeffrey Beeler, an analyst at Dataquest, Inc. Thanks to Version 3, migration from XA to ESA will take only a few weeks at most, he says.

Product series: 4381
Model name: 4381 Model Group 91E, 4381 Model Group 92E
Base price: Group 91E — $577,500 (Model P91); $661,500 (Model R91); $1.05 million (Model R92); $745,500 (Model S91); $1.13 million (Model S92); $829,500 Model T91); $1.2 million (Model T92)
Specifications: Further enhance the nondisruptive growth path from the IBM mid-range into the IBM high-end processor line. Base function, features, performance capacity equal to Model Groups 23 and 24. Supports ESA/370; expanded storage capability (16M- to 32M-byte memory).
Introduced: Feb. 15, 1988
Ship date: November 1988
Initial outlook: Specialized models supporting ESA. The 4381 line continues to meet the needs of a large number of users who require mainframe-class performance below the 3090.
Current status: The 4381 line is still going strong, according to Dataquest's Beeler. An overlap in performance — between the high end of the 4381 and the low end of the 3090 — is a fairly new phenomenon in the IBM world,

Greco is a free-lance writer and editor based in Boston.

obviously aimed at upward migration to 3090, says Beeler (ESA provides the bridge). However, he says users hooked on the 4381's popular air-cooled environment won't like the water-cooled system of the 3090.

MARCH 1988

Product series: Advanced Interactive Executive (AIX) operating system
Product name: AIX/370
Price: On a one-time charge basis, by processor group:
Group 10 — $28,350
Group 20 — $53,550
Group 30 — $78,750
Group 40 — $151,200
Monthly license charge for all processors — $3,150
Specifications: Runs as a guest under VM/SP or VM/SP XA; can coexist with CMS and other guest operating systems such as MVS on the same processor. Compatible with AT&T Unix System V Releases 2 and 4.3 and Berkeley Software Distribution. Provides connectivity facilities that support exchange and sharing of data and programs for peer-to-peer and workstation-to-host environments, including Transmission Control Protocol/Internet Protocol (TCP/IP), X.25, Network File System, Transparent Computing Facility.
Introduced: March 15, 1988
Ship date: March 1989
Initial outlook: Part of IBM's sudden support for Unix.
Current status: So far, AIX is "more noise than action," says Shaku Atre, president of Atre Computer Assistance. Why the big AIX push? The government market, Atre says, in which Unix is the order of the day.

APRIL 1988

Product name: DB2 Version 2 Release 1
Price: Monthly license charge: $3,060-$4,140; one-time charge: $108,000-$223,550
Specifications: The relational database management system for the MVS/SP Version 3 (MVS/ESA) and MVS/SP Version 2 (MVS/XA) environments. Offers a breakthrough in performance and new function that enhances DB2's use for critical production applications and decision-support environments. Demonstrated high-volume transaction processing, up to 438 transaction/sec. Extends support of the relational model with referential integrity.
Introduced: April 19, 1988
Ship date: Fourth-quarter '88
Initial outlook: DB2 has grown to about 2,800 strong and has been greatly enhanced, Atre says. However, she adds, most DB2 users are not yet using the popular relational database manager in a production environment. Also, DB2 lacks features like support for mismatches. IBM is counting on independent software vendors to develop add-on products, such as a performance monitor, while Big Blue concentrates on the engine, Atre says.

JUNE 1988

Product series: IBM Personal System/2
Product name: PS/2 Model 70 386 (8570 E61/121)
Price: $5,995-$7,995
Specifications: Has a 16- or 20-MHz Intel Corp. 80386 32-bit microprocessor, up to 16M bytes of high-speed real memory, 60M or 120M bytes of disk storage, advanced graphics and an optional Intel 80387 math coprocessor.
Introduced: June 2, 1988
Ship date: June 2, 1988
Product name: PS/2 Model 70 386 (8570-A21)
Price: $11,295
Specifications: Combines a 25-MHz 386 32-bit microprocessor, an Intel 82385 memory cache controller, a 64K-byte memory cache, high-density memory technology and a wide range of integrated features. Capable of supporting up to 16M bytes of high-speed real memory, 120M bytes of disk storage, advanced graphics and an optional 25-MHz 80387 math coprocessor.
Introduced: June 2, 1988
Ship date: Third-quarter '88
Product name: PS/2 Model 50 Z
Price: $3,995-$4,595
Specifications: Features a 10-MHz Intel 80286 16-bit microprocessor. New high-speed (85-nsec) memory will provide zero-wait state processor performance and may be upgraded to 2M bytes of memory on the system board. New 30M- and 60M-byte hard files provide greater capacity and improved average access time over the Model 8550-021.
Introduced: June 2, 1988
Ship date: June 2, 1988
Product name: PS/2 Model 25 LS
Price: $2,139-$2,484
Specifications: A low-priced, general-purpose workstation preconfigured with the IBM Token-Ring network PC Adapter for use in a local-area network. Available in monochrome and color versions. Includes numeric keyboard and 640K bytes of random-access memory. Features 8-in. expansion card slot and one 3½-in. diskette drive.
Introduced: June 2, 1988
Ship date: June 2, 1988
Initial outlook for series: Shores up PS/2 line by filling in gaps with three versions of long-rumored Model 70 386, including models using the Micro Channel and sporting clock speeds of 25, 20 and 16 MHz.
Current status: Bruce Stephen, senior PC analyst at International Data Corp. (IDC), doesn't believe the Extended Industry Standard Architecture, being developed by a group of IBM competitors, will hurt sales of Micro Channel models.

In fact, IDC expects more than half of IBM's PC sales this year to be Micro Channel machines. However, users are still waiting for more hard evidence of the Micro Channel's advantages, like plug-in boards that are more than just Micro Channel versions of standard products, Stephen says. "IBM keeps promising them, but there's no definite schedule laid out."

Product series: Application System/400
Product name: 9404 Model B10, Model B20
Price: $19,000 (Model B10); $33,500 (Model B20)
Specifications: 0.5-3 MIPS. Compact, low-end models provide 48-bit addressability, 4M- to 16M-byte memory and up to 945M-byte disk storage. The Model B10 supports an average of 4-12 users; the Model B20 supports 8-20 users. Features include a low noise level; standard 110-volt electrical requirement; "plug-in-and-go" capabilities; connections for up to 40 local twinaxial and an additional 36 ASCII workstations; optional battery back-up; unique 40,000-circuit CMOS logic chips.
Introduced: June 21, 1988
Ship date: Aug. 26, 1988
Product name: 9406 System Unit
Price: $26,500 (Model B30); $62,500 (Model B40); $133,500 (Model B50); $229,500 (Model B60)
Specifications: High-end models featuring rack-mounted metal cabinets; modular packaging for easy upgrades; processing power up to 45,000 commercial transactions per hour under IBM Ramp C benchmark tests; up to 96M bytes of internal memory; up to 27.2G bytes of fixed-disk storage; connections for up to 480 local workstations; supports a network of up to 130,000 remote workstations; up to 32 communications lines; and service for up to two IBM Token-Ring LANs.
Introduced: June 21, 1988
Ship date: Aug. 26, 1988
Product name: AS/400 Total System Packages
Price: $17,500-$57,500; price advantages of $1,500-$5,000 over separately priced components.
Specifications: Advantageously priced, easy-to-install systems that ensure consolidated delivery of all components. Six offerings meet the needs of small and large users. Base package includes the system unit, appropriate disk and memory capacity, a save/restore device and preloaded operating system.
Introduced: June 21, 1988
Ship date: Aug. 26, 1988
Initial outlook for series: Consolidates System/36 and 38 while providing a long-awaited, relatively painless upgrade for small and midsize businesses.
Current status: Judging by user feedback and value-added reseller inquiries, AS/400 sales are "robust," says John Dunkle, vice-president of Workgroup Computing at the Aberdeen Group. It's not a VAX killer, analysts agree, but it will pose a problem for smaller mid-range vendors like Wang Laboratories, Inc., Data General Corp. and Hewlett-Packard Co.

The AS/400 could also pose a threat to IBM's own 9370, although it's not targeted at that market. For those who have a 3090 but wouldn't consider buying a 9370, the AS/400 might be the solution for automating certain departments in large companies, Dataquest's Beeler says.

Product name: OS/400
Price: $5,500 (Model B10); $10,500 (B20); $14,000 (Model B30); $25,000 (Model B40); $38,000 (Model B50); $55,000 (Model B60)
Specifications: Provides single, integrated operating system for all models; productive application environment; electronic customer support; on-line education; and connectivity to remote devices, systems and networks. Implements the IBM strategic architectures, including SAA. Supports more than 20 programming, database and user query languages, including Basic, Cobol, Pascal, PL/I, RPG/400, RPG II, RPG III and SQL.
Introduced: June 21, 1988
Ship date: Third- and fourth-quarter '88
Initial outlook: Marks a departure in IBM's approach to operating systems by providing a large set of diverse functions such as security and database and communications support, including network management.
Current status: Unlike OS/2, OS/400 seems to be complete the first time around, Aberdeen Group's Dunkle says: "There are no gaping holes in it to date." This first version is fully SAA-compliant and includes the requisite communications hooks, he adds.

JULY 1988

Product name: OS/2 Extended Edition Version 1.0
Price: $830
Specifications: Addresses up to 16M bytes of memory. Includes all features of OS/2 Standard Edition 1.0 plus an advanced relational Database Manager and Communications Manager in a single package. The Communications Manager provides a wide range of concurrent connectivities and protocols, concurrent emulation of multiple terminal types, file transfer, multiple programming interfaces and communications and systems management support. The Database Manager is consistent with the DB2, SQL/DS and QMF members of the IBM family of relational database products.
Introduced: July 19, 1988
Ship date: July 29, 1988

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Initial outlook: More marketing hype then actual product
Current status: Highlights OS/2's future as very broad operating system for connectivity, says IDC's Stephen.

For companies that are into the "grand scheme of micro-to-mainframe connectivity." Single users, however, are waiting for Presentation Manager and applications.

Product: RT Models 130, 135, B35
Price: $23,220 (Model 130)
$30,595 (Model 135)
$32,165 (Model B35)
Specifications: A full-function 32-bit workstation for use as an independent system or connected to a host computer. The RT Model 130 is a desktop unit, and the Models 135 and B35 are floor-standing machines. All come with 16M bytes of CMOS memory, four times that previously offered.
Introduced: July 19, 1988
Ship date: July 29, 1988
Initial outlook: New models provide better performance.
Current status: The largely unsuccessful RT still needs a major performance boost to bring it in line with Apollo Computer, Inc. and Sun Microsystems, Inc. machines, says Lew Brentano of Infocorp. He praises the two-dimensional graphics but says CPU performance is only about 3 MIPS. With the reduced instruction set computing chip design, IBM could double the RT's speed, Brentano says.

Product series: Enterprise System/3090
Model name: ES/3090 Models 120S, 150S, 170S, 180S
Price: $985,000 (Model 120S)
$1.65 million (Model 150S)
$2.1 million (Model 170S)
$2.85 million (Model 180S)
Specifications: Single-CPU systems, each using one 64K-byte high-speed buffer, up to 256M-byte expanded storage and up to 32 channels. Configured for single-image operation; support 370/XA and ESA/370 operating systems.
Introduced: July 26, 1988
Ship date: Models 120S and 150S: September 1988; Model 170S, 180S: fourth-quarter '88
Model name: ES/3090 Models 200S, 300S, 280S
Price: $5.4 million (Model 280S)
$4.9 million (Model 200S)
$6.7 million (Model 300S)
Specifications: Model 200S is a didactic processor; 280S is a two-way multiprocessor; 300S is a triadic processor.
Introduced: July 26, 1988
Ship date: Fourth-quarter '88
Model name: ES/3090 Models 400S, 500S, 600S
Price: $9.5 million (Model 400S)
$10.95 million (Model 500S)
$12.4 million (Model 600S)
Specifications: Support for up to 512M-byte central storage, 2,048M-byte expanded storage and 128 channels.
Introduced: July 26, 1988
Ship date: Fourth-quarter '88
Initial outlook for series: Marks second major overhaul of the line since it was introduced in 1985. As expected, sales of 3090 E models have flattened out this year, but the S series should serve as a mid-life kicker, analysts say. The mainframe business is still IBM's bread and butter, and "there is no end in sight for demand or capacity," Dataquest's Beeler says.

Product name: Vector Facility
Price: $325,000 per side; additional, $230,000 per side
Specifications: Provides three- to five-times faster vector-divide instruction; high-speed buffer doubled to 128K bytes; cycle time down from 17.2 to 15 nsec.; 1.2 times faster scalar multiply.
Introduced: July 26, 1988
Ship date: July 26, 1988
Initial outlook: Part of IBM's philosophy to get major sites, like the engineering department of a Big Three car manufacturer, to do a whole job on a mainframe instead of a Cray Research, Inc. supercomputer and another system, says Hesh Wiener, publisher of *Computer and Communications Buyer* in New York.
Product name: MVS/ESA operating system
Price: Graduated license charges for selected new versions of MVS and VM software include:
$3,060-$5,520 (MVS/SP Version 3 JES2)
$3,440-$6,210 (MVS/SP Version 3 JES3)

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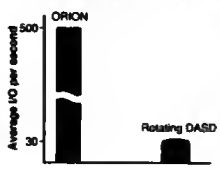

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Circle Reader Service Number 12

$446-$805 (TSO/E Version 2)
$510-$920 (RMF Version 4)
$2,295-$4,140 (DB2 Version 2)
$2,865-$5,175 (VM/XA SP)
Specifications: Provides improved response time through more efficient handling of large amounts of data. Allows customers to run both current and newly created applications more efficiently.

ES/3090 600S operating under MVS/ESA SP 3.1.0 provides up to 56% greater internal throughput than the previous model operating under MVS/XA SP 2.2.0.

ES/3090 180S operating under MVS/ESA SP 3.1.0 with CICS provides approximately 33% greater internal throughput than the previous model operating under MVS/XA SP 2.2.0 with CICS.
Introduced: April 19, 1988
Ship date: July 26, 1988

AUGUST 1988

Product series: Expert systems
Product name: Expert System Environment Version 1 Release 2
Price: Monthly license fee: $2,360; one-time license charge: $42,500 (MVS version); graduated one-time charge: $21,240-$57,570 (VM version)
Specifications: Embedded application programming interface, allowing the software to be embedded within an IMS, CICS, TSO or batch application. MVS system support allowing the software to take full advantage of MSA/XA by exploiting the MVS/XA 31-bit addressing scheme.
Introduced: Aug. 16, 1988
Ship date: December 1988
Product name: Expert System Consultation Environment/PC
Price: Single copy free to all current and new licensees of Expert System Environment. Additional copies: $595.
Specifications: Ability to run a consultation session under DOS on a stand-alone IBM PS/2, Personal Computer AT or PC XT from a knowledge base created on a host processor under MVS or VM. Direct external interface to programs written in assembler, Pascal and C.
Introduced: Aug. 16, 1988
Ship date: March 1989
Initial outlook for series: IBM overhauled its flagship artificial intelligence product to include its mainstream data processing environments: MVS/CICS, IMS and batch.

Product name: IBM Knowledgetool Version 2 Release 1
Price: Graduated monthly license charge: $307-$1,960; graduated one-time charge: $9,205-$105,880
Specifications: Program product status; windowed, full-screen, interactive debug and trace facility; separate development and delivery environments, resulting in the need for fewer system resources when running completed applications; extended rule blocks, allowing the creation of generally usable rules packages for a variety of application; reentrancy.
Introduced: Aug. 16, 1988
Ship date: March 1989
Initial outlook: Mainframe expert system with enhancements such as a test facility with a windowing capability.

Product name: IBM KEE
Price: Monthly license charge: $4,900; one-time charge: $98,000
Specifications: 370 VMS/XA TSO version of Intellicorp, Inc.'s Knowledge Engineering Environment (KEE) 3.1, jointly developed by IBM and Intellicorp. Compatible with all earlier versions of Intellicorp's KEE. Broad spectrum of widely used knowledge representation techniques and inferencing capabilities. Powerful end-user graphics interface for developers.
Introduced: Aug. 16, 1988
Ship date: December 1988
Initial outlook: Intellicorp system designed for professional programmers with expert system expertise.

SEPTEMBER 1988

Product name: PS/2 Model 30 286
Price: $1,995-$2,595 (with 20M-byte hard disk)
Specifications: Very large-scale integration chip set; 80286 processor; AT bus; Micro Channel's advanced Video Graphics Array; 1.44M-byte floppy drive; 512K bytes of memory.
Introduced: Sept. 13, 1988
Ship date: September 1988
Initial outlook: IBM saw its PC market share decline about 15% from 1986 to 1987, according to IDC. Enter the Model 30 286, which IDC predicts will be IBM's most popular machine in the fourth quarter. However, it should steal more sales from the old Models 30 and 50 than from the AT clones, IDC's Stephen says. "Strengthens the line as a whole, but it's sort of a piecemeal strengthening," says Dave Marshak of the Seybold Consulting Group.

Product series: 9370
Product name: Model 30
Price: $37,000
Specifications: CMOS technology; 370 architecture implemented on single processor card; doubles the performance of older Model 20; housed in same cabinet as Model 20.
Introduced: Sept. 13, 1988
Ship date: October 1988
Product name: 9375 Model 50
Price: $70,000
Specifications: CMOS technology; 370 architecture implemented on single processor card; doubles the performance of older Model 40; rack-mount unit similar to Models 40 and 60.
Introduced: Sept. 13, 1988
Ship date: October 1988
Product name: 9377 Model 80
Price: $142,000
Specifications: Thermal Conduction Module technology; about 1½ times the performance of older Model 60.
Introduced: Sept. 13, 1988
Ship date: October 1988
Initial outlook for series: Although the much-maligned 9370 has suffered disappointing sales, the latest models achieve price/performance gains of 10% to 30%, analysts say. But the 9370 line still needs more raw horsepower, Datapquest's Beeler says. The additions fill holes in the existing 9370 line without cannibalizing the 4381. "What we got is what we expected," Annex's Djurdjevic says.

Product series: OSI
Product name: OSI Systems Message Exchange
Price: One-time charge: $13,000-$43,000
Specifications: Provides message handling in multivendor environment; includes X.400 Professional Office System connections; support for the ISO's Open Systems Interconnect (OSI) over X.25 networks.
Introduced: Sept. 20, 1988
Ship date: December 1988
Product name: OSI Communications Subsystem
Price: Varies (one-time charge plus monthly license fees)
Specifications: Provides support for OSI protocols and network management as well as FTAM and in the future, X.500.
Introduced: Sept. 20, 1988
Ship date: March 1990 (MVS); June 1990 (VM)
Product: TCP/IP for MVS Release 1.0
Price: Varies (one-time charge plus monthly license fees)
Specifications: File transfer to remote systems using FTP LAN connections to Token-Ring, PC Network and Ethernet.
Introduced: Sept. 20, 1989
Ship date: June 1989
Initial outlook for series: Buried in the announcement is support for the Common Management Interface Protocol, an ISO standard. "That means that Netview will be managing ISO-standard nets," says Frank Dzubeck, president of Communications Network Architects. In other words, under the OSI Communications Subsystem, the Netview release in 1990 will be able to manage OSI and SNA networks — without having to go through Netview PC.

Product series: Netview
Product name: Netview Release 3
Price: One-time charge: $9,470-$81,600
Specifications: Supports Rexx, PL/1, C and Knowledgetool, IBM's expert system shell.
Introduced: Sept. 20, 1988
Ship date: May 1989 (MVS/XA); August 1989 (VM)
Product name: Netview/PC 1.2
Price: $3,000
Specifications: OS/2 Extended Edition version of IBM's interface between Netview and third-party networking devices.
Introduced: Sept. 20, 1988
Ship date: May 1989
Initial outlook for series: These products add to or enhance options that sit on top of Netview, including Distribution Manager, Access Manager and Net DA. "This filled in some of the gaps in support functions," Dzubeck says, "and that's something you're going to see on a continuing basis."

OCTOBER 1988

Product name: DB2 Version 2, Release 2
Price: Graduated one-time charge: $108,000-$223,550 or monthly license of $3,060-$4,140
Specifications: Allows multisite reads of a DB2 database, single-site update of a remote DB2 site and updates from IMS, CICS or batch. Applies DB2 security features across a network.
Introduced: Oct. 4, 1988
Ship date: Third-quarter '89
Initial outlook: Although limited by itself, DB2 2.2 is a building block in IBM's master plan to provide distributed data capability across SAA. •

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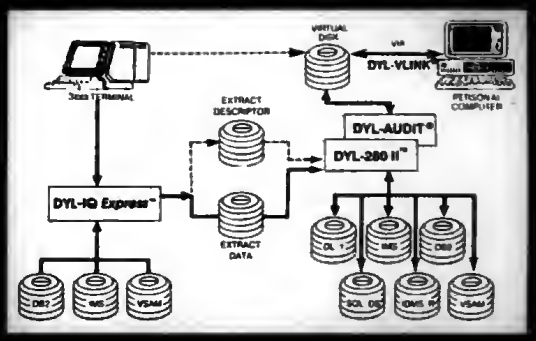

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Bottom Line

IBM's Year of Restructuring

BY MICHAEL GERAN

Following 1987, dubbed The Year of the Customer, 1988 is IBM's Year of Restructuring. Facing tepid revenue and profit growth in the U.S., the company reshaped its structure, consolidated its operations (especially in the U.S.) and refreshed its product lines. Growing competition from other vendors and the absolute necessity for faster product development cycles are driving these dramatic changes.

At least in terms of financial performance, the reorganization is helping to place IBM on the comeback trail. IBM is expected to report revenue of about $58 billion in 1988, up 7.2% from 1987, and net income of about $5.89 billion, up 11%. However, IBM must go a very long way to return to its 18% to 20% operating margin target; this year, IBM's margin is expected to be about 14%. Again, as in 1987, cost controls, not strong revenue gains, account for the profit gains.

A tale of two cities

Looking at IBM from another viewpoint, however, the picture is quite different. For example, in 1988 international operations will account for almost 90% of the approximate revenue gain of $4 billion.

IBM's U.S. revenue will rise about 1% and international revenue 12%. In fact, international revenue could account for almost 57% of IBM revenue in 1988. In short, IBM is a tale of two cities — a very prosperous operation overseas and a struggling U.S. operation, at least in terms of financial growth performance.

Viewed on a product or line-of-business basis, the picture is similar. For example, mainframe shipment growth is better overseas than in the U.S.; personal computer sales are increasing twice as fast overseas; and more than 58% of mid-range shipments are scheduled for international, not U.S., homes.

To improve the long-term U.S. outlook, IBM has once again taken drastic action; it is restructuring its U.S. operations in an attempt to alter the cost/revenue relationship. IBM's sobriquet is: "A company that will be the most efficient in the business and that will grow with, or better than, the industry." Given its U.S. revenue losses of 1% in 1987 and about a 1% gain in 1988, IBM has not yet accomplished this goal.

Internal growth key

To do a better job, IBM will consolidate several U.S. plants, reduce headquarters staff again and attempt to dramatically improve the efficiency of the support function.

In sum, after a staff reduction of 15,000 to 20,000 in 1987, IBM plans to eliminate another 3,000 to 4,000 in 1988 or 1989. Since the company will offer a magnanimous severance package, part of the estimated $600 million expense will be charged to operations in the second quarter of 1988. This will depress 1988's operating margin, but IBM hopes to benefit in 1989 and beyond in financial terms.

The company hopes to hold operating margins with only a 4% to 5% rate of revenue gain, thus growing profits faster if and when it can achieve an 8% to 10% revenue gain.

Clearly, then, the key to a sustainable profit renaissance for IBM is an improvement in revenue growth, especially in the U.S. To achieve that, IBM needs earlier and better participation in the emerging or faster growing market segments. And to achieve that, in turn, it needs better software and better exploitation of technology.

After all, IBM has invested more than $10 billion in research and development in the past two years and plans to spend at least another $15 billion during the next three years.

Processors are still IBM's largest source of revenue, accounting for $13.9 billion in 1987 and about $15 billion in 1988. After strong gains in 1986, growth declined in 1987 because IBM lacked a strong mid-range system. This year, a recovery is just beginning with the commencement of AS/400 and 3090 S shipments.

Processor revenues are expected to rise about 7.5% in 1988, with a strong fourth-quarter gain. In essence, lower prices in a very competitive U.S. market limited the revenue effects of the strong 3090 unit shipment gains. The AS/400 and better 9370 sales in 1988 than in 1987 turned around the weakness in the mid-range, but it will be 1989 before the full effects are achieved. We expect IBM to install 7,000 to 10,000 AS/400s in 1988 and 25,000 to 30,000 in 1989.

Finally, there is another source of strong revenue gains for IBM: software. After increases of 32% in software revenue in 1986 and 24% in 1987, a 19% gain is expected with revenue of over $8 billion in 1988.

IBM must set lower prices and offer better functionality and an expanded product line of business applications to be more competitive in this segment.

The weakest part of IBM in 1988, at least in terms of revenue trends, will be maintenance. A decline of at least 2% to 3% is expected in this area; in fact, for the first time, program product revenue will be greater. Once again, U.S. weakness plays a major role, partly because of intense competition. Other factors contributing to the less-than-expected revenue growth are reliability, longer warranties and product mix changes.

IBM continues to follow a step-by-step evolution for the 3090, thus deferring the introduction of its next generation, Summit, until after 1990. The 3090-S and ESA announcements in 1988 were good examples of IBM's strategy for the 1980s, and similar moves are expected in 1989.

IBM's second largest revenue source has been peripheral products, but in 1988 that area will most likely fall to third place as the faster growing office station/workstation computer passes it in revenues, driven by the personal computer/workstation business.

The woolly tale of the PC

The saga of IBM's personal computer business in 1988 is a great story and partly a lesson in attempting to induce customers to do something that is correct in the long term but may not be that correct in the short term.

While IBM's personal computer revenue will be up 15% to 20% in 1988 over a strong 1987, the rate of gain will be less than the industry's. Confusion concerning the immediate advantages of the Micro Channel Architecture, the slow release of OS/2 and the U.S. production phaseout of the older PC models mean IBM is losing market share in the U.S. retail channel and at the lower end of the family.

PC clone companies using the old architecture and Intel Corp. 80286-based models gained market share. By the end of the year, IBM had repositioned the low end with new models without the Micro Channel and released DOS 4.0 in an attempt to regain momentum.

But everything is relative. By the end of September, IBM had shipped three million Personal System/2 models. Once again, international growth rates were twice as good as those in the U.S. ●

Slimming margin

IBM's cost controls are creating profit gains without strong revenue growth

Geran is vice-president of equity research at Nikko Securities Co. International in New York.

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